



*Personal Computer
Hardware Reference
Library*

Guide to Operations

68X2618

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Revised Edition (April 1984)

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FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: The equipment described herein has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with noncertified peripherals is likely to result in interference to radio and TV reception. If peripherals not offered by IBM are used with the equipment, it is suggested to use shielded grounded cables with in-line filters if necessary.

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or TV reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or TV reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
- Ensure that card slot covers are in place when no card is installed.
- If peripherals not offered by IBM are used with this equipment, it is suggested to use shielded, grounded cables, with in-line filters if necessary.

If necessary, consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

CAUTION

This product is equipped with a line cord and plug for the user's safety. It is to be used in conjunction with a properly grounded receptacle to avoid electrical shock.

Preface

The *Guide to Operations* introduces you to the IBM Personal Computer. If you are setting up or using the Personal Computer, you need this publication. It has seven sections:

SECTION 1, INTRODUCTION, displays two typical system arrangements and identifies a wide variety of options available to you.

SECTION 2, SETUP, contains instructions for cabling and running the system self-tests.

SECTION 3, OPERATIONS, introduces you to the IBM Personal Computer. Whether you are a newcomer or an experienced operator, this section will become a ready reference. It contains information about displays and the keyboard.

SECTION 4, PROBLEM DETERMINATION PROCEDURES, describes the steps to correct problems that may occur.

SECTION 5, OPTIONS, is where information included with the various options should be inserted. Switch setting charts are also provided because it is sometimes necessary to change switches when options are added to your system.

SECTION 6, RELOCATE, provides information needed if it becomes necessary to disconnect cables and relocate your system. Recommendations are given to prevent damage to the units.

SECTION 7, KEYBOARD TEMPLATES, provides graphic layouts of keyboards available to you when using National DOS.

Protruding tabs help you find the section you are looking for. Each section has a contents page listing the subjects in the section.

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Introduction

The basic IBM Personal Computer consists of a system unit and keyboard. The system unit is the central part of your Personal Computer and supports a variety of options. The keyboard, which is what you use to send data to your system, attaches to the system unit with a 2-meter (6-foot) coiled cable. The keyboard is divided into three major sections: the typewriter area, the numeric keypad and the function keys.

You may add a display, printer, expansion unit, memory, and other options to expand your system to meet your particular needs.

The IBM Personal Computer is designed for use with monitors or televisions that meet either the National Television System Committee (NTSC)¹ standard or the Electronics Industry Association (EIA) RS 170 standard. Therefore, if your device does not meet these standards, it may not function properly.

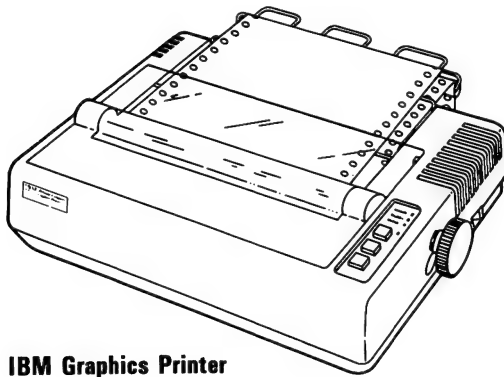
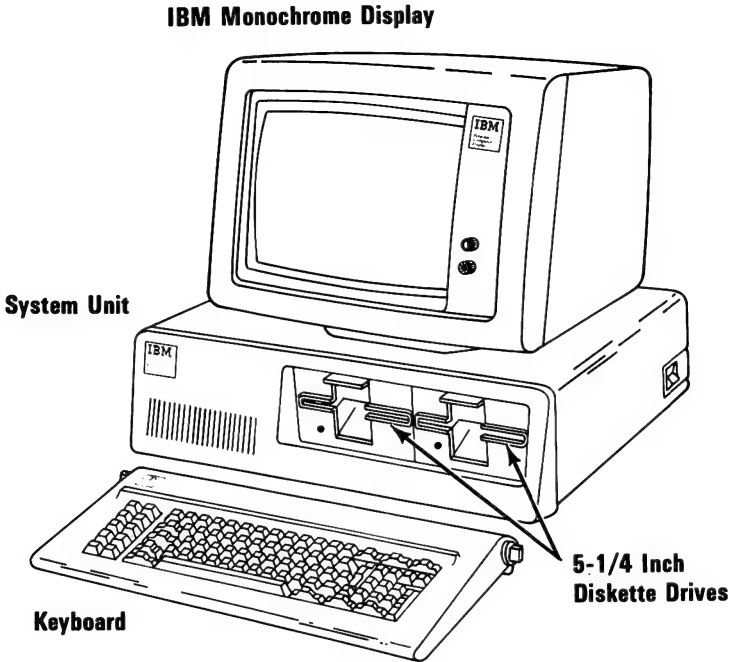
Several printers are available for printouts or hard-copy of your data files. The IBM Graphics Printer provides bidirectional printing, in several character sizes on single- or multi-part forms. A Color Printer is also available, as well as a Compact Printer.

The expansion unit provides space for additional options to be attached to your IBM Personal Computer.

The non-IBM devices in this manual are for illustration only, and their use here does not constitute a recommendation or an endorsement by IBM. Selection, interconnection, and use of another manufacturer's device, are the sole responsibility of the customer.

¹ The National Television System Committee has set United States TV broadcast standards.

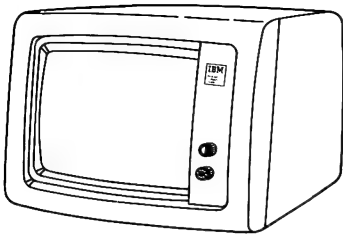
Example of a System Arrangement



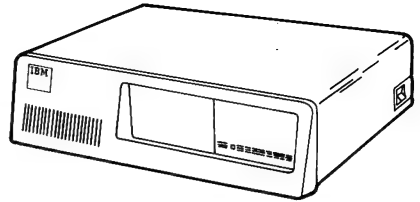
This example shows the system unit, keyboard, IBM Monochrome Display, and IBM Graphics Printer. Two 5-1/4 inch diskette drive units are used to store programs and data. Hard-copy output is provided with the IBM Graphics Printer.

Option Examples

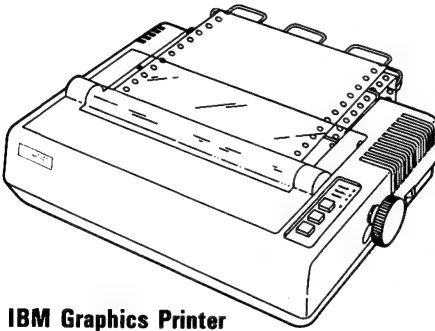
These are options which you can add externally to your system.



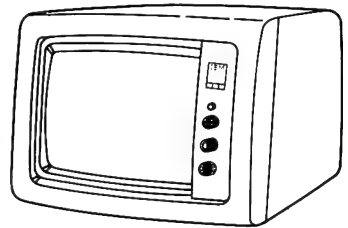
IBM Monochrome Display



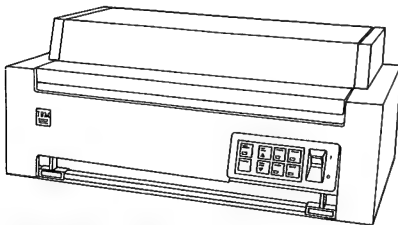
Expansion Unit



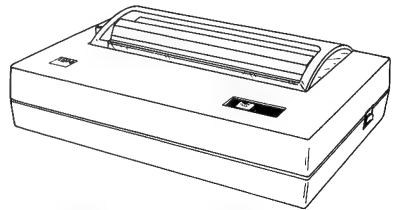
IBM Graphics Printer



IBM Color Display



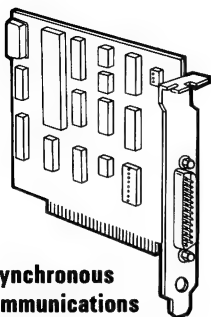
IBM Color Printer



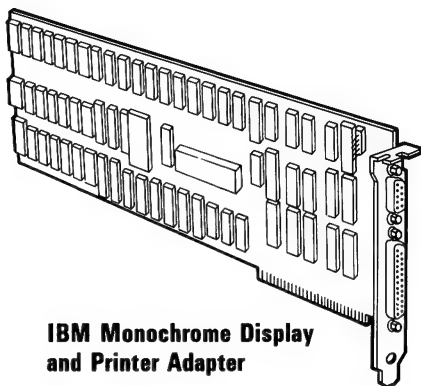
IBM Compact Printer

Option Examples

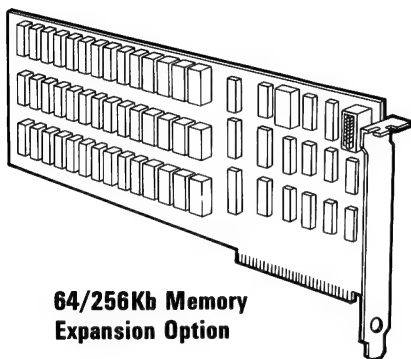
These are some of the options which you can install in your system unit or expansion unit.



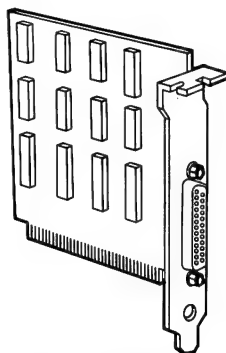
**Asynchronous
Communications
Adapter**



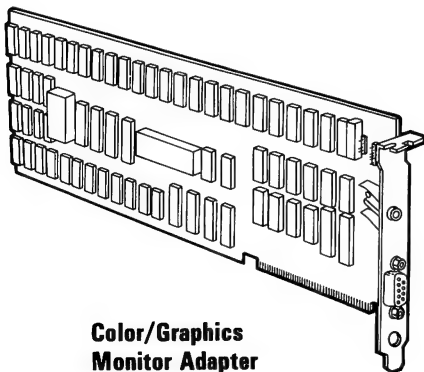
**IBM Monochrome Display
and Printer Adapter**



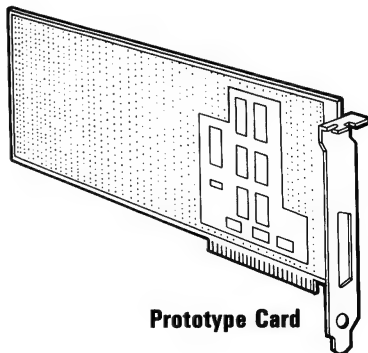
**64/256Kb Memory
Expansion Option**



Printer Adapter



**Color/Graphics
Monitor Adapter**

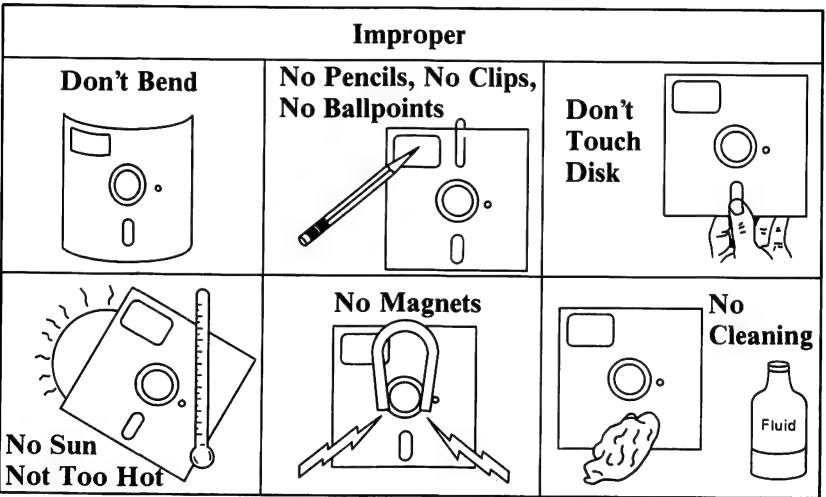
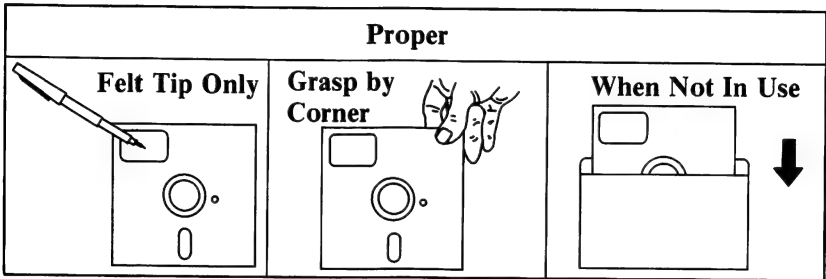


Prototype Card

Handling Diskettes

Please read the following before continuing.

The figures below show some proper and improper ways of handling your diskettes. Proper handling will greatly reduce the possibility of damaging your diskettes.



Notes:



SECTION 2. SETUP

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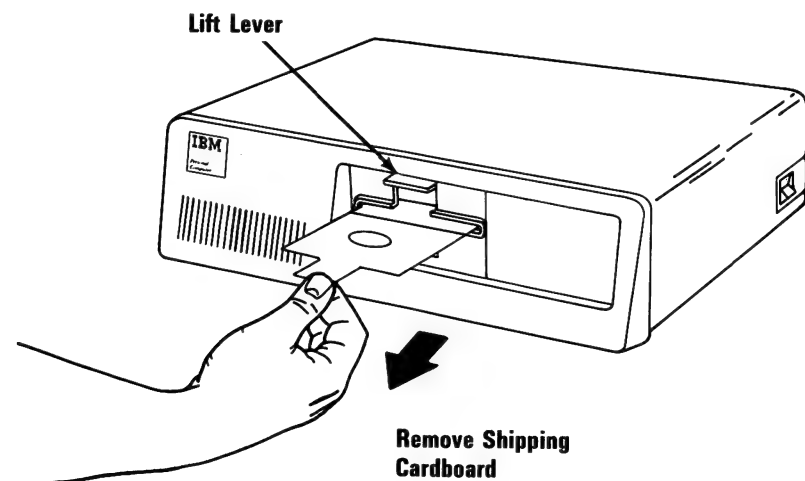
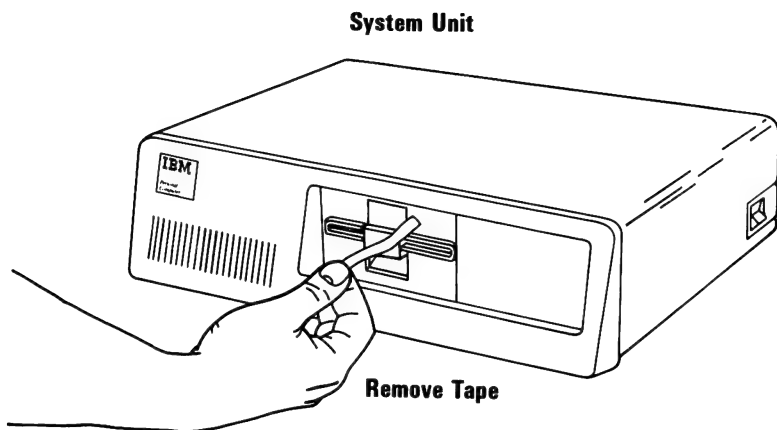
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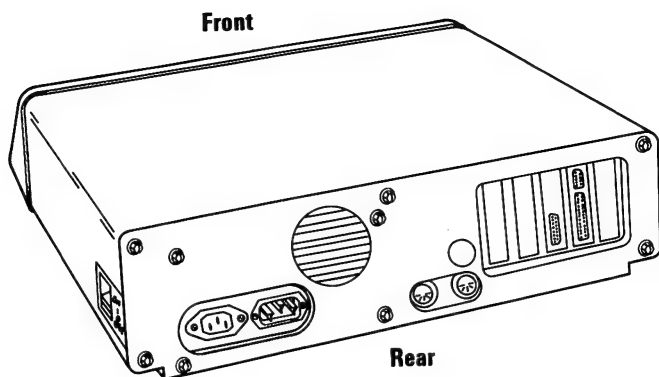
Installation

- 1 If your Personal Computer came with a 5-1/4 inch Diskette Drive installed in the system unit, remove the shipping cardboard.

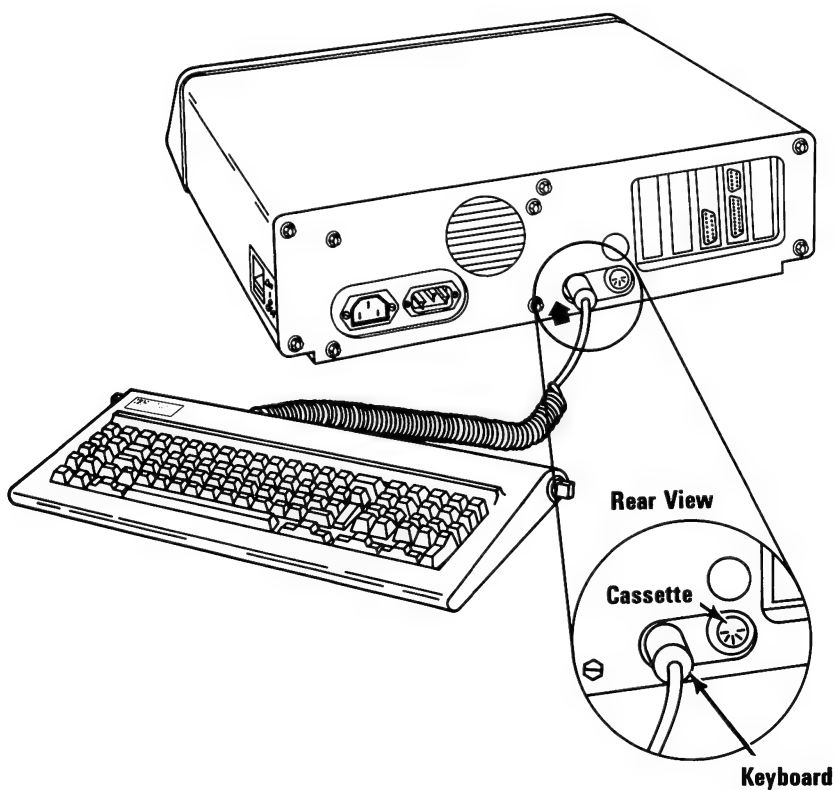


Note: If you anticipate transporting your system in the future, save the shipping cardboard to use then.

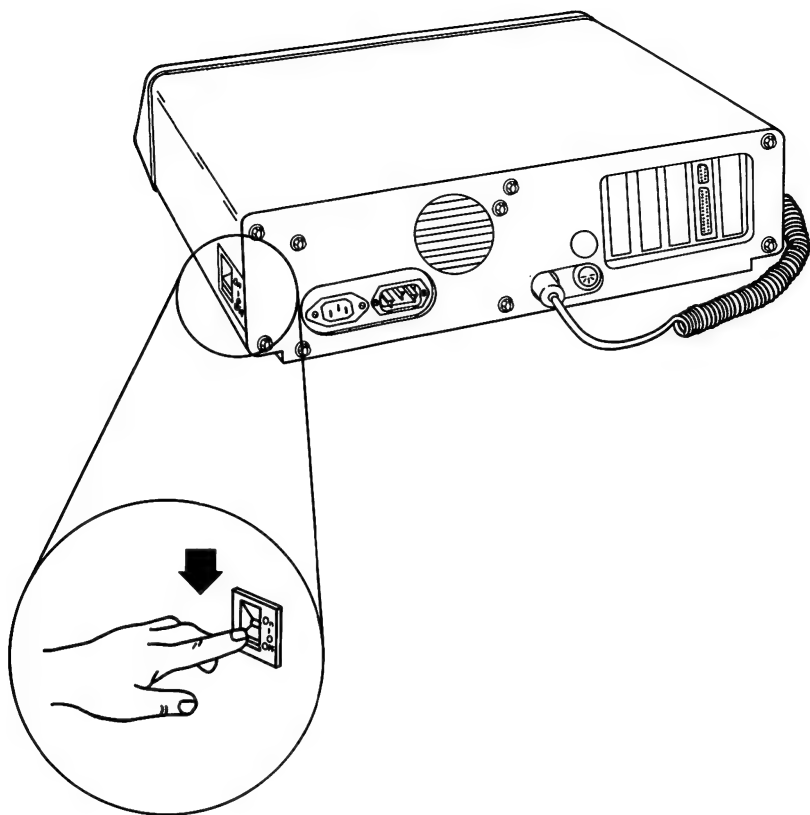
- 2** Place the system unit in the position as shown.



- 3** Connect the keyboard cable to the system unit.



4 Set the system unit's Power switch to Off.

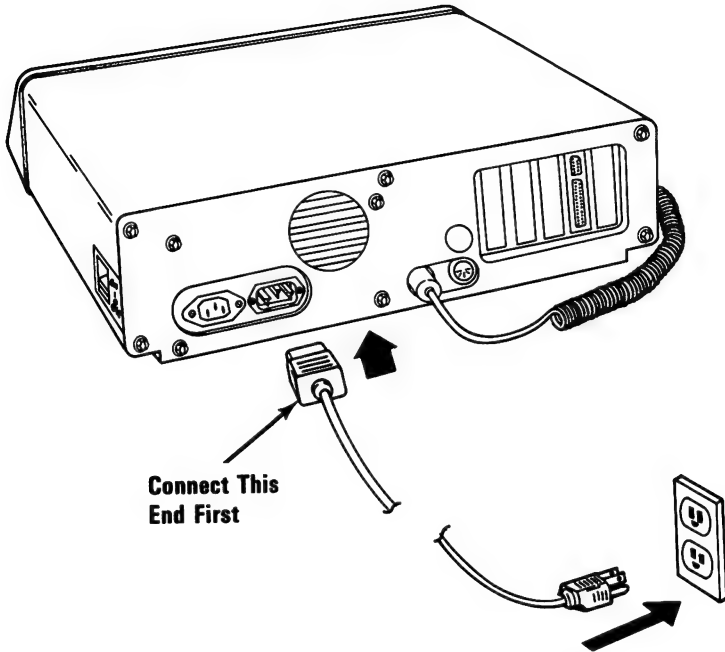


| Is the International symbol for On.

○ Is the International symbol for Off.

5

Connect the system unit's power cord to the system unit, then to the wall outlet.



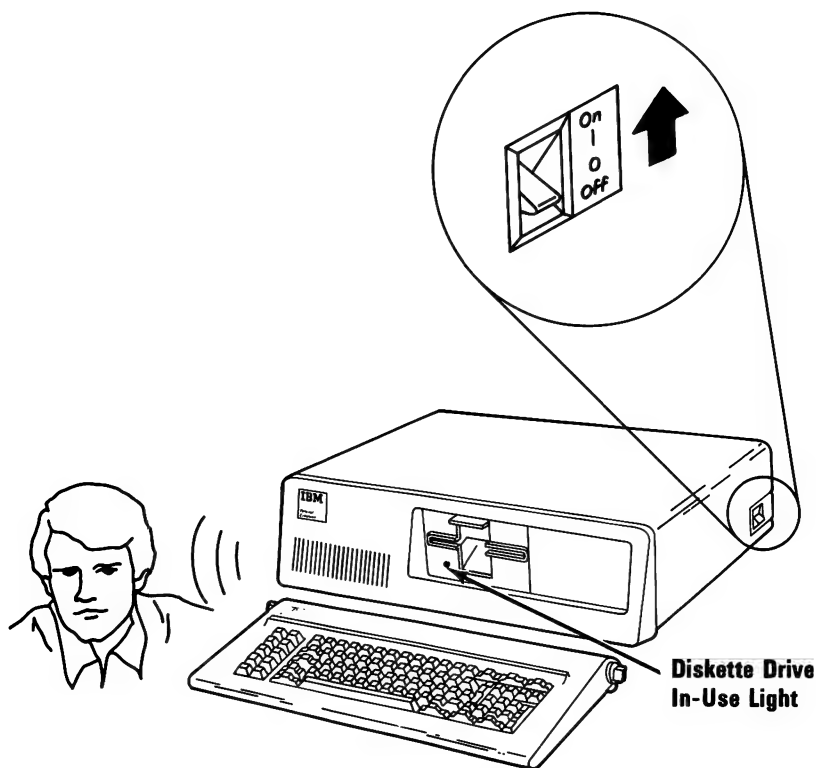
CAUTION

This product is equipped with a line cord and plug designed for the user's safety. It is to be used with a properly grounded power receptacle to avoid possible electrical shock.

Mini Power-On Self Test

Set the system unit's Power switch to On. You should hear one short beep after the memory is checked. This will take between 13 and 90 seconds, depending on the amount of memory installed.

If you have a diskette drive installed, it is normal to hear motor noise and see the In-Use light on for a short time.



If you heard one short beep, your system unit has completed its self-test.

If you hear nothing or anything other than the short beep and the diskette drive, return your IBM Personal Computer to your place of purchase.

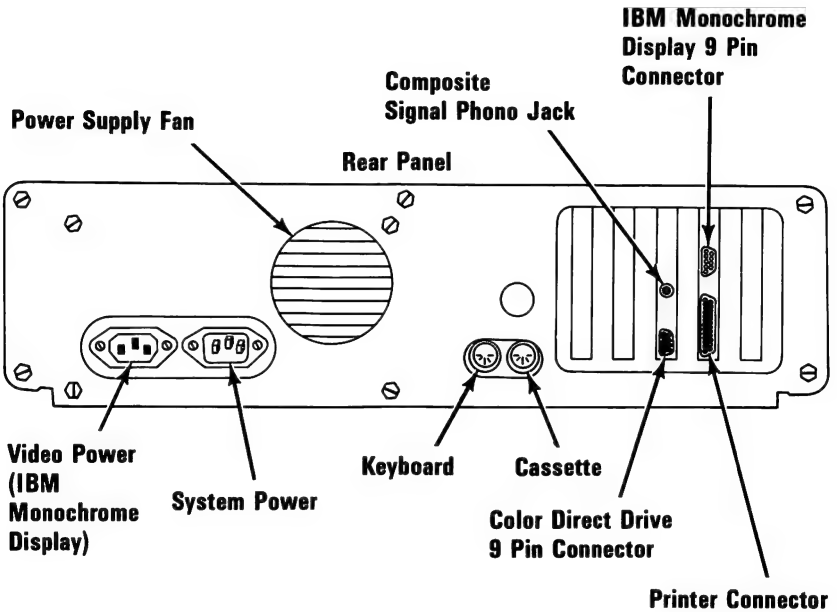
If you have any options you would like to install, go to the Option Installation Instructions that came with your option. Be sure to read "Handling Static-Sensitive Devices" in Section 5 before installing an option in your IBM Personal Computer. You may save time if you follow the sequence listed below when installing your options.

- **64KB Memory Module Kits**
- **5-1/4 inch Diskette Drives**
- **All other option adapters**

When you are finished, return to this section and continue.

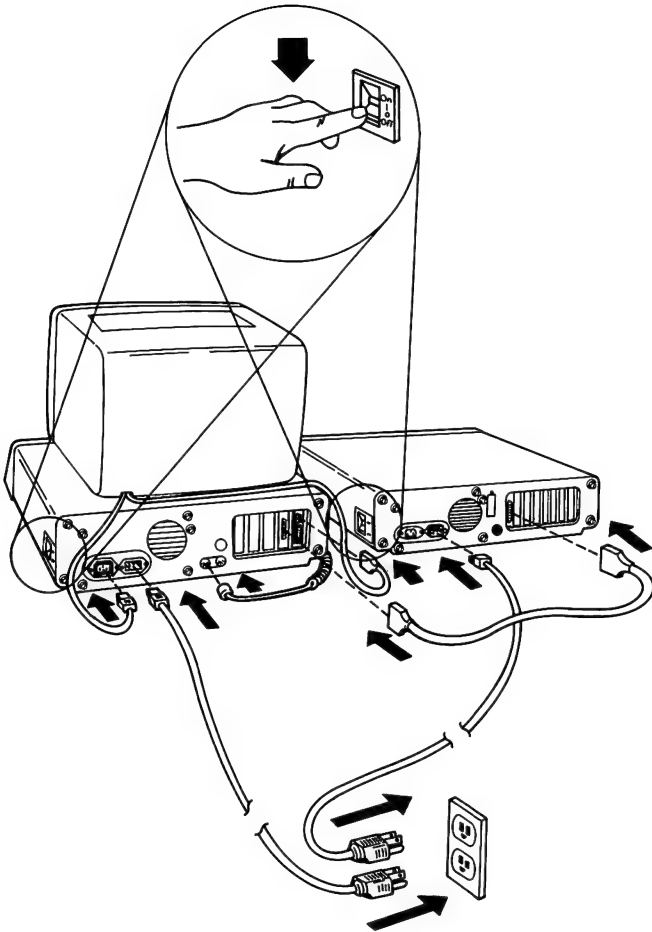
Rear Panel Reference

- 1 Use the reference diagram below and connect all cables and cords. If you have an expansion unit to connect to your Personal Computer, the next step shows how to cable the expansion unit to the system.



2

If you have an expansion unit, connect it to your IBM Personal Computer as shown below. Connect the expansion unit's power cord to the expansion unit, then to the wall outlet.



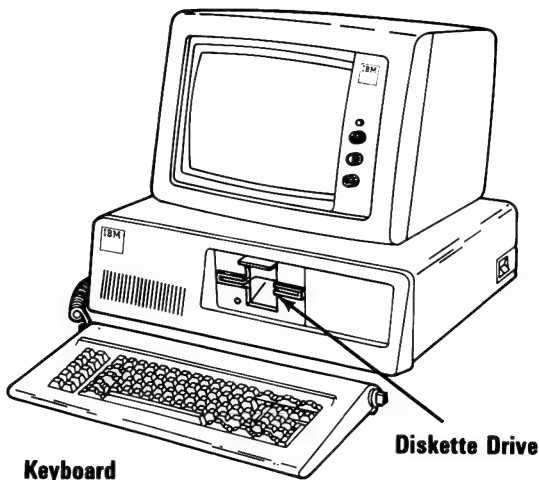
CAUTION

This product is equipped with a line cord and plug designed for the user's safety. It is to be used with a properly grounded power receptacle to avoid possible electrical shock.

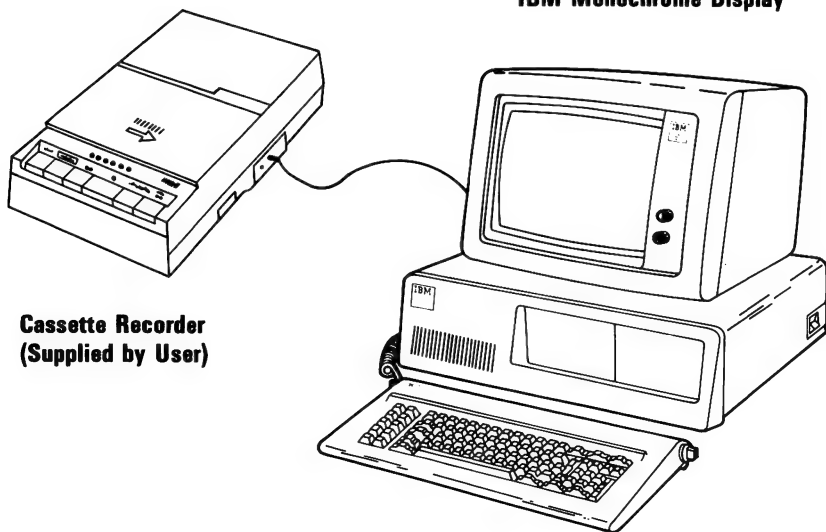
Component Arrangement

Position your system components so you can use them comfortably. (TV should be at least 30 cm [12 inches] from the diskette drive.) Two possible arrangements follow:

IBM Color Display



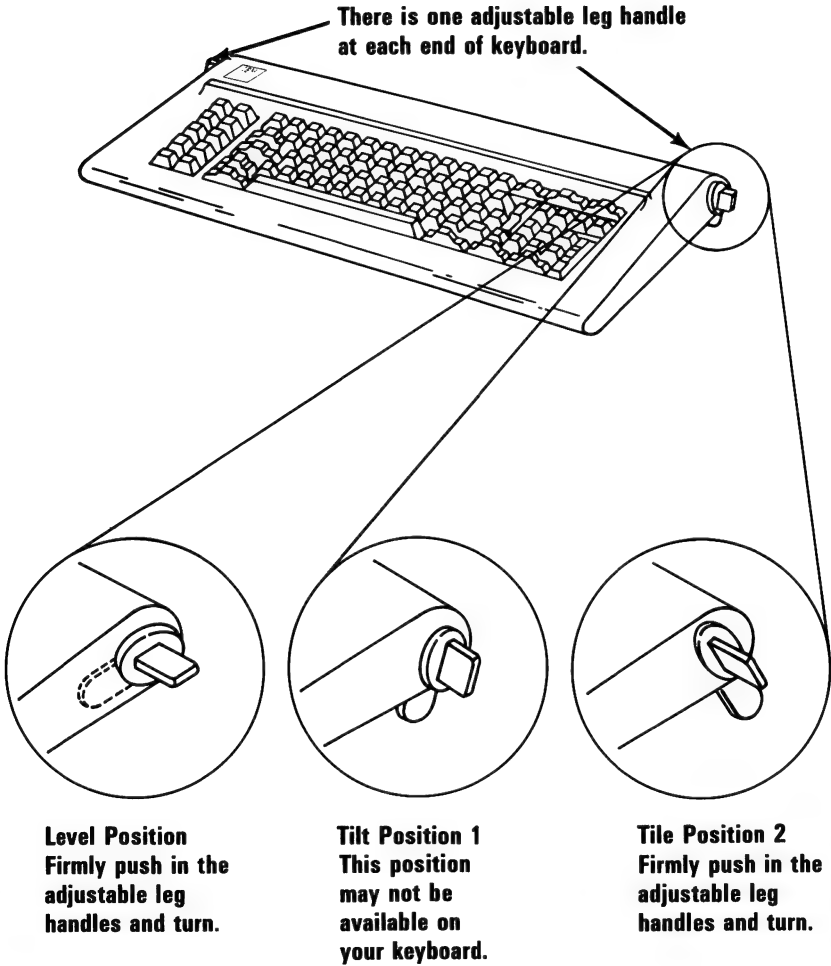
IBM Monochrome Display



Keyboard and Display Adjustment

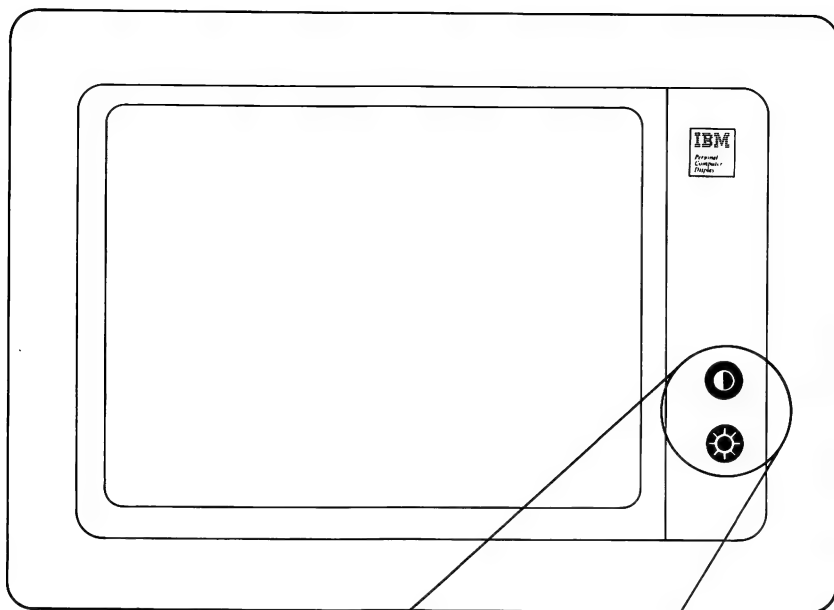
- 1** The keyboard has adjustable tilt positions for typing comfort. Hold the keyboard when changing positions.

Firmly push in the adjustable foot handles and turn them to desired tilt position.

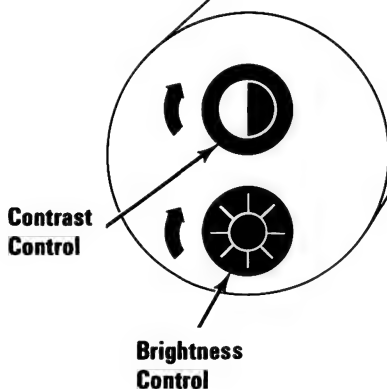


Note: Tilt position 1 may not be available on your keyboard.

- 2** Turn the Contrast and Brightness controls on your display fully clockwise.



**IBM Monochrome
Display**



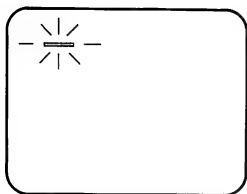
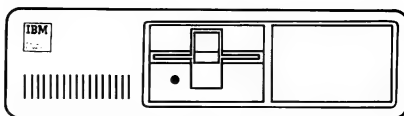
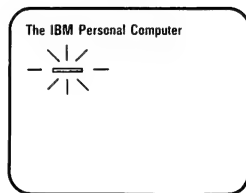
**Your IBM Personal Computer is ready for a
power-on self test.**

Power-On Self Test (POST)

If you have an expansion unit attached to your Personal Computer, the expansion unit must *always* be turned on first unless otherwise indicated. If this is not done, an error is indicated on the display. To recover, power must be turned off on all devices then power turned on with the expansion unit being turned on before the system unit.

When you first set the system unit's Power switch to On a power-on self test (POST) occurs. The POST takes 13 to 90 seconds depending on the amount of memory installed.

- 1** Set the Power switch on the expansion unit (if attached) to On.
- 2** Turn on all attached devices, then set the system unit Power switch to On. There will normally be three responses:
 - A** The cursor will appear on the screen in approximately 4 seconds.
 - B** One short beep will be heard after the memory is tested.
 - C** The IBM Personal Computer BASIC message will appear on the screen.

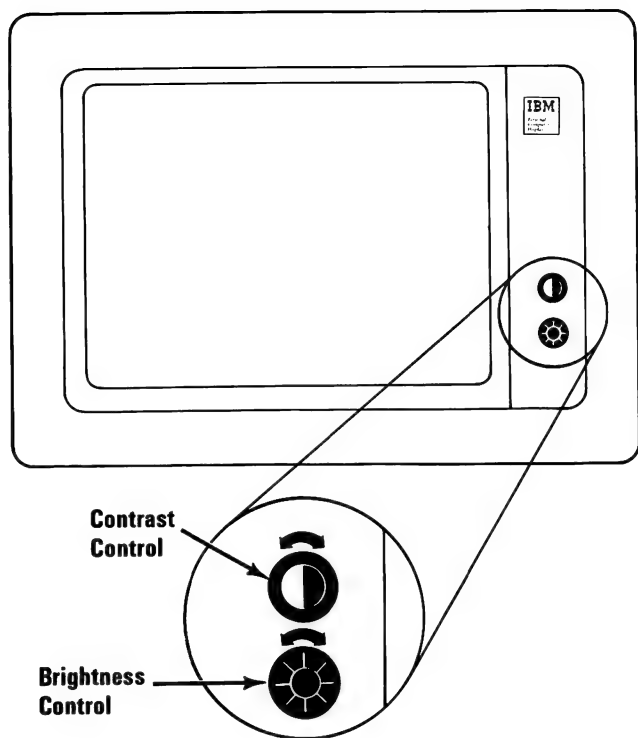
A**B****C**

Note: These three responses tell you that the POST has successfully completed. Other information will appear on the screen, but this is not important at this time. If you have diskette drives and/or a printer (that you turned on), you will also hear and see responses from these; ignore these responses.

If the responses were incorrect, go to "Problem Determination Procedures."

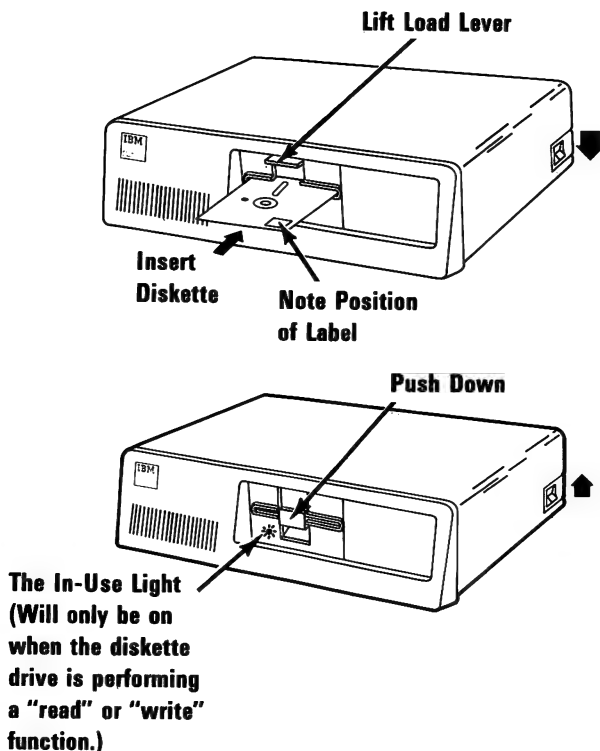
If the responses were correct, go to Step 3.

3 Adjust Contrast and Brightness controls for eye comfort.





Loading Diskette Diagnostics

- 1** Get the Diagnostics diskette from the back cover of this manual.
- 2** Set the system unit's Power switch to Off.
- 3** Lift the load lever.
- 4** Insert the Diagnostics diskette as shown pushing it in until it stops.
- 5** Push the load lever down and it will latch closed.
- 6** Set the system unit's Power switch to On.



If you are using a non-IBM display with your IBM Personal Computer, and the information on the screen is shifted to the left or right, as in the example below, press Function

key  to move the information to the right or Function key  to move the information to the left.

e IBM Personal Computer **DIAGNOSTICS**
rsion XXX (C) Copyright IBM Corp XXXX, XXXX
LECT AN OPTION
- RUN DIAGNOSTIC ROUTINES
- FORMAT DISKETTE
- COPY DISKETTE
- PREPARE SYSTEM FOR RELOCATION
- EXIT TO SYSTEM DISKETTE
SERT DIAGNOSTIC DISKETTE IN DRIVE
AND ENTER THE ACTION DESIRED
?

If the information on your screen is not centered, center it at this time and continue.

The IBM Personal Computer is designed for use with monitors or televisions that meet either National Television System Committee standards or Electronic Industry Association RS 170 standards. If your device does not meet these standards, it may not function properly.


Note: A non-IBM display can cause data errors when the 5-1/4 inch Diskette Drive is in use. This interference is usually corrected by moving your TV at least 30 centimeters (12 inches) away from your IBM Personal Computer.

7

Compare your screen with the figure below; if the screen does not match, go to "Problem Determination Procedures."

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX
SELECT AN OPTION
0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE
INSERT DIAGNOSTIC DISKETTE IN DRIVE
A AND ENTER THE ACTION DESIRED
?

8

Press  on the top row of keys,

then



Summary

You now have installed and arranged your IBM Personal Computer. You also have learned how to perform the power-on self test (POST) and what responses to expect after a successful POST. You know the proper way to handle diskettes and how to align your screen. Now you are ready to give your system a complete diagnostic test, which you should do whenever you cable your system or install an option to verify its operation.

Now turn to "Problem Determination Procedures" and do a complete diagnostic testing of your system.

After you have completed the "Problem Determination Procedures" continue with Section 3, "Operations."


SECTION 3. OPERATIONS

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Getting Your IBM Personal Computer Ready	3-5
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Vertical Size Control	3-11
Keyboard	3-13
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The Numeric Keypad	3-18
Cursor Controls	3-20
Function Keys	3-22

Notes:

Introduction



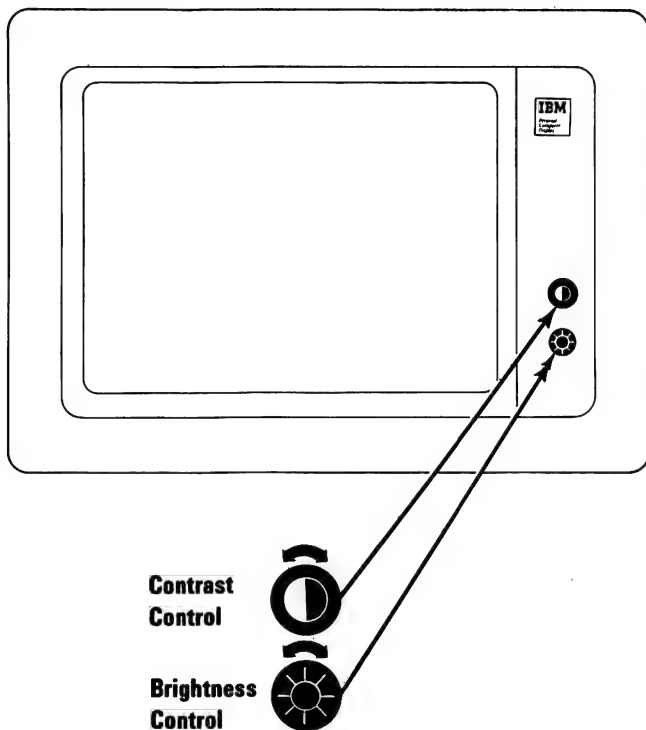
In this section are instructions to help you to start using your IBM Personal Computer. The controls and adjustments for the IBM Monochrome and Color Displays are discussed. This section also provides a graphic layout of the keyboard and each key.

You will notice as you begin this section that the system performs a power-on self test, or POST. This occurs each time you turn on your IBM Personal Computer.

Notes:

Getting Your IBM Personal Computer Ready

- 1 Turn display or TV Contrast and Brightness controls fully clockwise. (If your display has an On/Off control, set the control to On.)



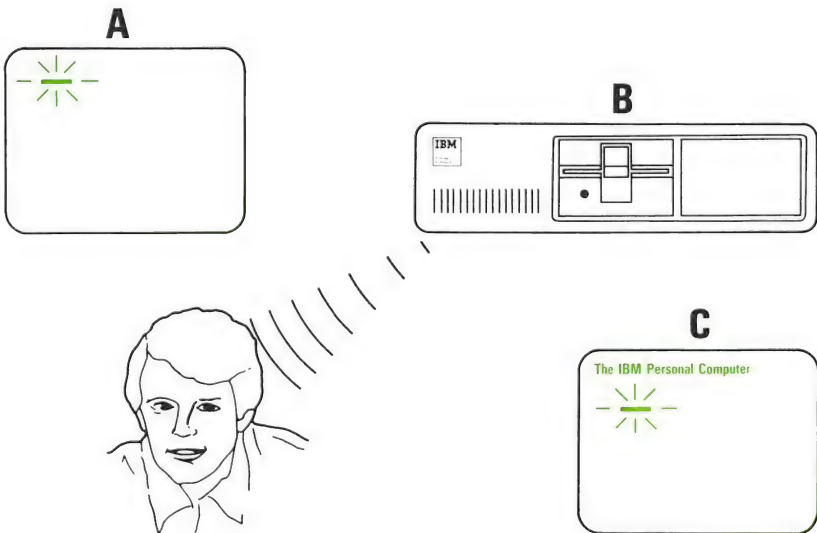
Note: The IBM Personal Computer is designed for use with monitors or television that meet either National Television System Committee standards or Electronic Industry Association RS 170 standards. Therefore, if your device does not meet these standards, it may not function properly.

When you first position the system unit switch to On, the power-on self test (POST) occurs. The time the POST takes (13 to 90 seconds) is determined by the amount of memory installed in your system unit.

- 2** Set the Power switch on the expansion unit (if attached) to On. Turn on all other attached devices.
- 3** Set the Power switch on the system unit to On.

Normally, you should observe three responses:

- A** The cursor will appear on the screen in approximately 4 seconds.
- B** One short beep will be heard after memory is tested.
- C** The IBM Personal Computer BASIC message will appear on the screen.



These three responses tell you that the POST has successfully completed. Other information will appear on the screen and it is not important at this time. If you have a diskette drive and/or a printer (that you turned on), you will also hear and see responses from these; ignore these responses at this time.

Remember an error message will appear on your screen if the system unit is turned on before the expansion unit, if you have an expansion unit installed. To recover, turn off the power to all devices then set the Power switch on the expansion unit to On, then turn on the system unit's power.

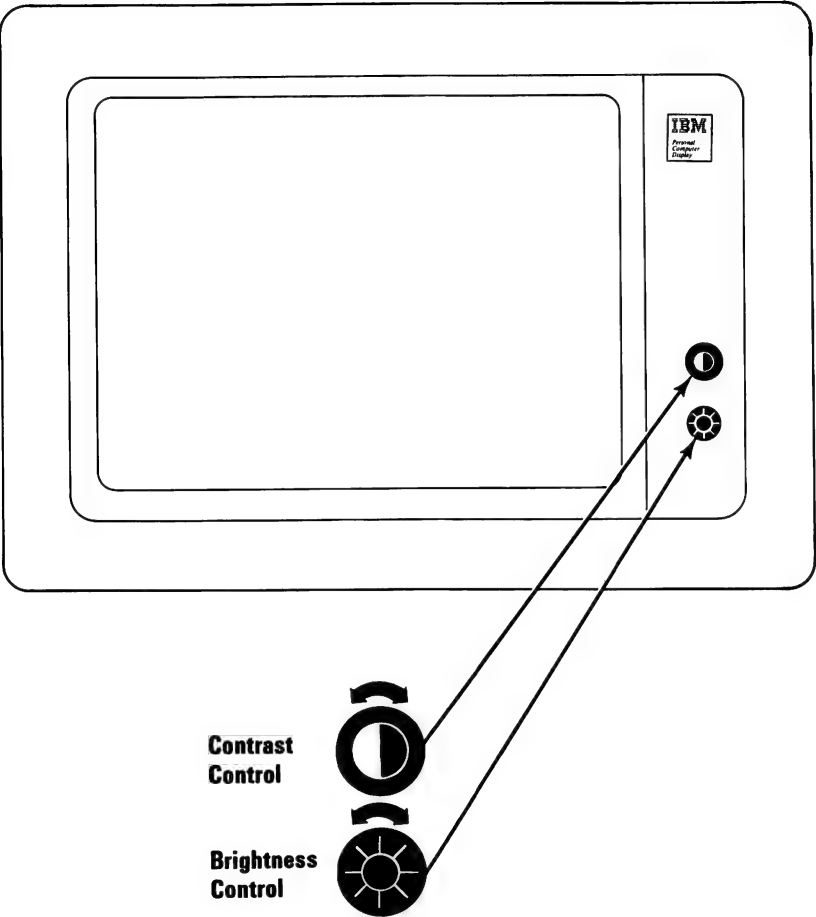
If the responses were not correct, or if your screen is not similar to the figure below, refer to "Problem Determination Procedures."

The IBM Personal Computer Basic
Version CX.XX Copyright IBM Corp XXXX
XXXXX Bytes free
OK

1LIST 2RUN 3LOAD" 4SAVE 5CONT 6LPT1 '7TRON 8TROFF 9KEY 0SCREEN

IBM Monochrome Display

Adjust Contrast and Brightness controls for eye comfort.



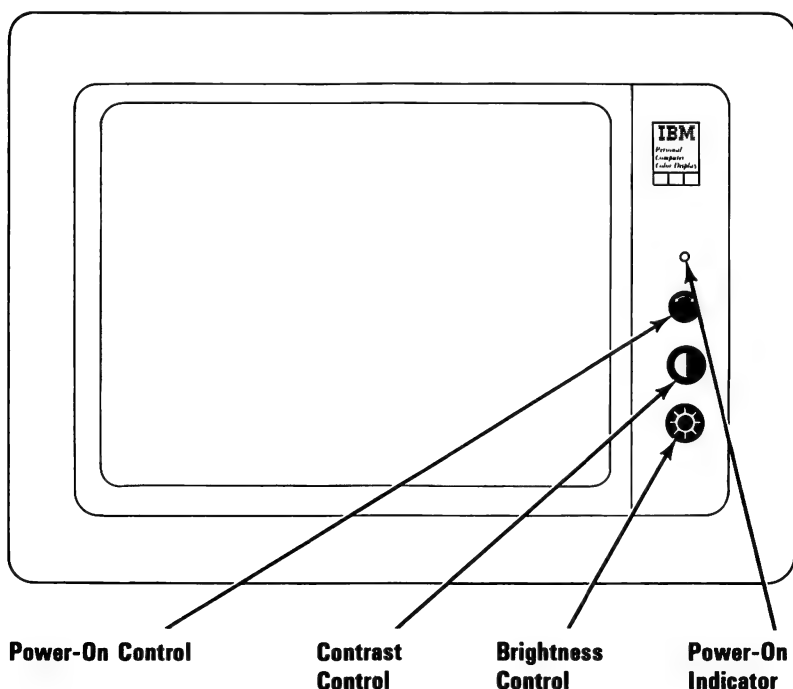
IBM Color Display

Controls

The Power-On control, when turned clockwise, applies power to the IBM Color Display and removes power when turned counterclockwise. The Power-On indicator lights when power is applied to the display.

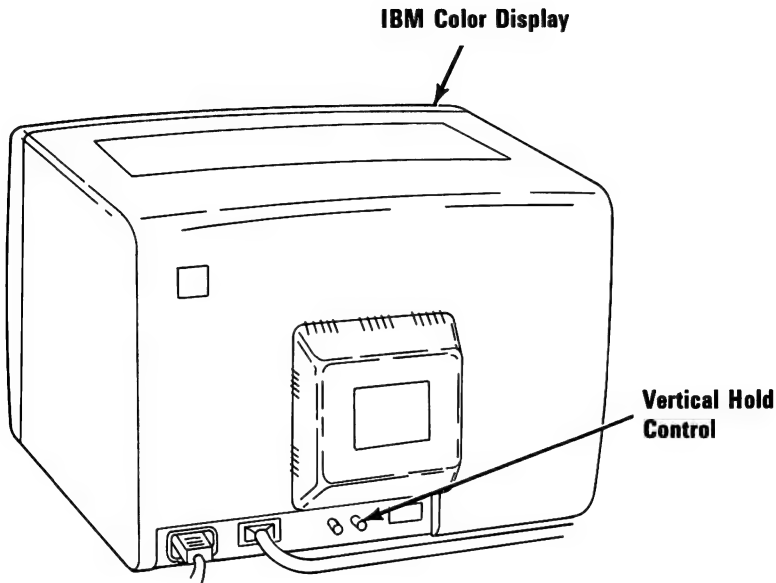
When the Contrast control is turned clockwise, it increases the brightness of black, blue, green, cyan, red, magenta, brown, and white. When turned counterclockwise, it decreases the brightness of these colors.

The Brightness control, when turned clockwise, increases the brightness of the entire screen and decreases it when turned counterclockwise.



Vertical Hold Control

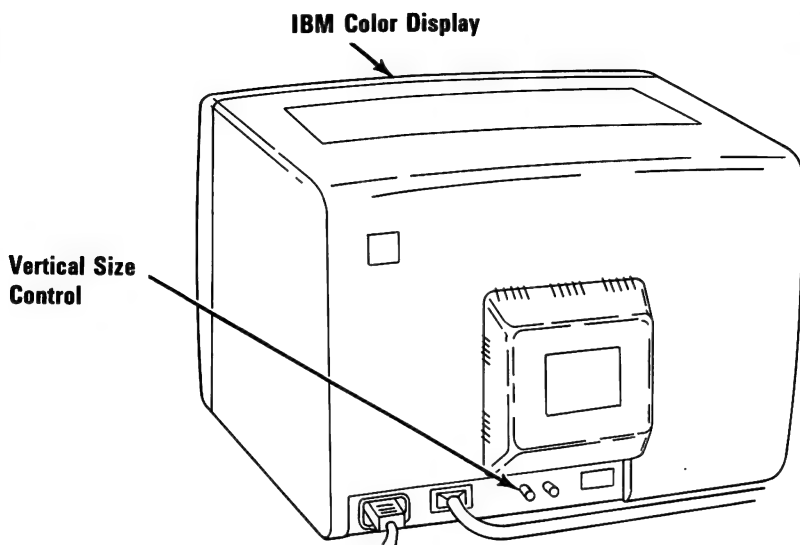
Use this control (as described below) only if your screen presentation is rolling from top-to-bottom or bottom-to-top.



- 1** Set the system unit Power switch and the display Power switch to On.
- 2** Wait for the completion of POST.
- 3** Turn the Vertical Hold control clockwise as far as it will go, then turn it counterclockwise until the screen presentation stops rolling.

Vertical Size Control

Use the control (as described below) only if the character size on your IBM Color Display is incorrect.



- 1** Set the system unit's Power switch (and expansion unit's power switch, if attached) to Off.
- 2** Set the display's Power control to On.
- 3** Turn the Brightness and Contrast controls fully clockwise.
- 4** Turn the Vertical Size control fully counterclockwise. A black area appears across the top and bottom of the screen.

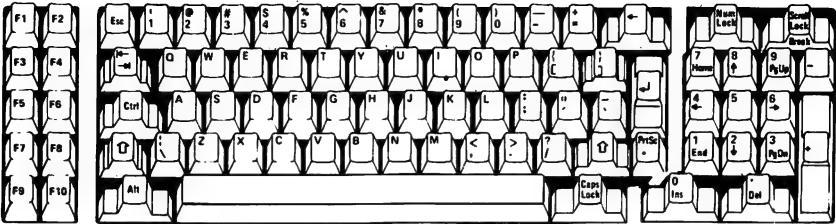
- 5** Turn the Vertical Size control clockwise until the black areas just disappear. If one of the black areas disappears before the other, continue to turn the control until the second black area is gone.
- 6** Adjust the Brightness and Contrast controls for eye comfort.



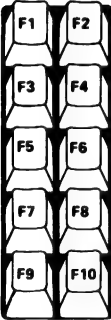
Keyboard

The keyboard consists of three sections: the typewriter area, the function keys, and the numeric keypad.

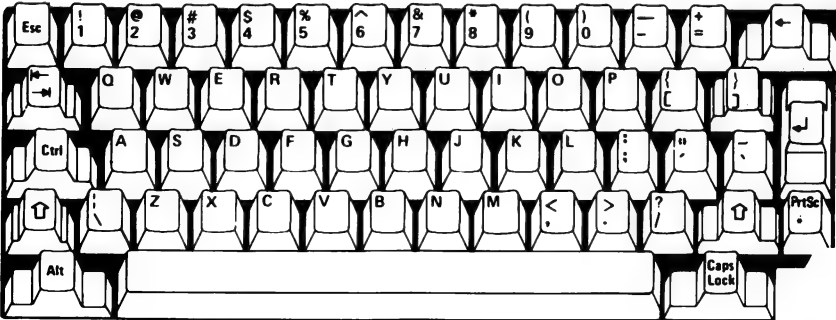
All keys are typematic; that is, they repeat as long as you hold them down.



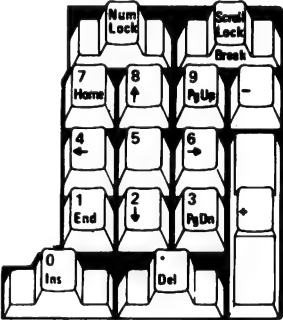
Function
Keys



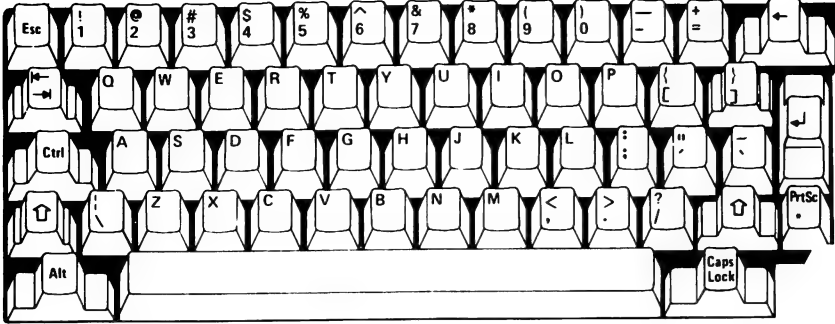
Typewriter Area



Numeric
Keypad



The Typewriter Area



Key positions in the typewriter area are much like those of a standard typewriter. Some additional keys, however, perform control functions.



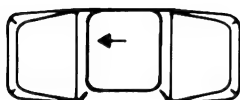
The Caps Lock key, when pressed once, locks the characters A through Z in the uppercase position. To shift to lowercase characters while Cap Lock is on, press the Shift key. Press the Caps Lock key again to release the uppercase mode for characters A through Z.



This is the Enter key. Its purpose is defined by the programming language or application you are using. Refer to the appropriate manual for its specific function.



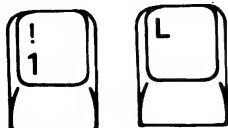
When the Print Screen key is pressed along with the Shift key, a copy of the screen presentation is printed. If the information on the screen is alpha/numeric characters, as in a program listing, a duplicate of the information is printed. If the information is a graphic representation, it can be reproduced only on a printer that supports graphic printing, such as the IBM Graphics Printer.



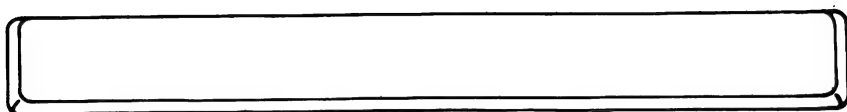
The Backspace key moves the cursor one position to the left. The character to the left of the cursor is erased.



When entering data into your computer, be aware that the number zero (0) and the letter O are not interchangeable.



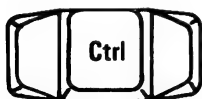
As with the zero and O, the number 1 and the lowercase letter L are not interchangeable.



When pressed, the spacebar moves the cursor to the right. Any character the cursor moves over is replaced with a blank.



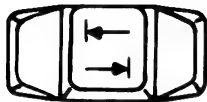
The Alternate key helps you with easy entry of BASIC statement keywords. When you press the Alt key and any alphabetic key A through Z, one of the BASIC keywords is entered. ASCII codes can also be entered by using the Alt key and the numeric keypad. For more information about the Alt key, see the *BASIC* reference manual.



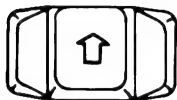
The Control key will perform a variety of functions. These are described in your operating system manual or application program manual.



The functions of the Escape key, also are described in your operating system or application program manual.



The Tab key moves the cursor to the next tab stop. Tab stops are defined in your operating system or application program manual.



The keyboard has two shift keys, which are in the typewriter area. Pressing either of these changes the keys in the typewriter area to the uppercase mode. When alphabetic keys are pressed, the characters appear as capital letters. When other keys in the typewriter area are pressed, the characters shown on the upper portion of the keys appear.

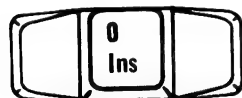
The Numeric Keypad



Pressing the Numeric Lock key once places keys 0 through 9 of the numeric keypad in the numeric state. Then when keys 0 through 9 are pressed, numbers appear on the screen. Pressing NumLock again returns keys 0 through 9 to cursor-control keys.



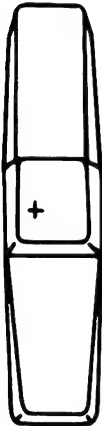
The purpose of the Scroll Lock key is defined in your operating system manual or application program manual.



Pressing the Insert key enables you to add characters in the middle of a line. Press it again and you're back to normal operation.

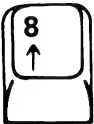
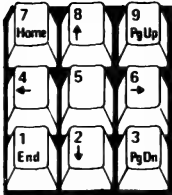


When you press the Delete key, the character at the current cursor position is erased and all characters to the right of the erased character move one position to the left.

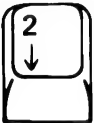


When the Plus and Minus keys are pressed, a plus or minus sign appears on the screen.

Cursor Controls



Cursor Up moves the cursor one line up.



Cursor Down moves the cursor one line down.



Cursor Right moves the cursor one character position to the right.



Cursor Left moves the cursor one character position to the left.



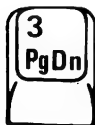
The function of the Home key is defined by your operating system or application program. See the appropriate manual for a description.



End moves the cursor one position to the right of the last character on the line.

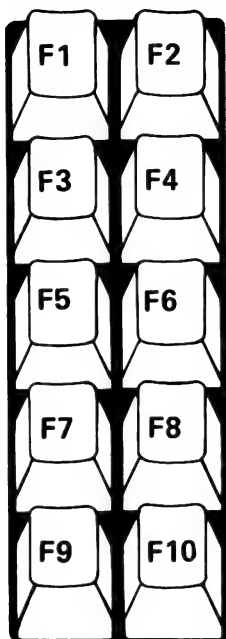


Page Up is defined by your operating system or application program. See the appropriate manual for a description.



Page Down also is defined by your operating system or application program manual. See the appropriate manual for a description.

Function Keys



Function keys F1 through F10 are always under program control. See your operating system manual or application program manual.

SECTION 4. PROBLEM DETERMINATION PROCEDURES

Introduction

If you experience a problem with either your IBM Personal Computer or IBM Personal Computer XT, the problem determination procedures will help you find which unit in your system is failing. The procedures also can be used to check that your system is operating correctly. Simply follow the step-by-step instructions and answer yes or no to the questions asked.

As part of the problem determination, you may have to use the Diagnostics diskette, which is at the back of the manual. The diskette has a series of tests that check the five units of your system—system unit, expansion unit, keyboard, display, and printer—as well as other installed options. The tests are performed in sequence. As one test finishes successfully, the next one automatically starts.

Note: If you have a non-U.S. English keyboard and use the diskette in the back of this manual, use a U.S. English keyboard template.

For a screen-alignment problem, start on the following page. To do a complete system check or find the cause of a problem, start with “Checking Electrical Connections” on page Start 20-1.

Other Options

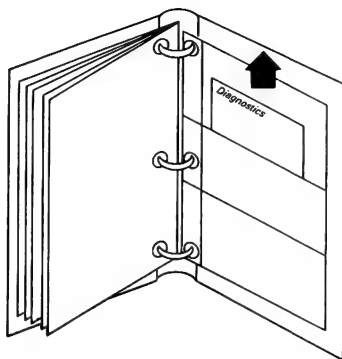
Some options may have separate manuals. For a description of problem diagnosis, go to that option's manual.

Notes:



Screen Alignment Procedure

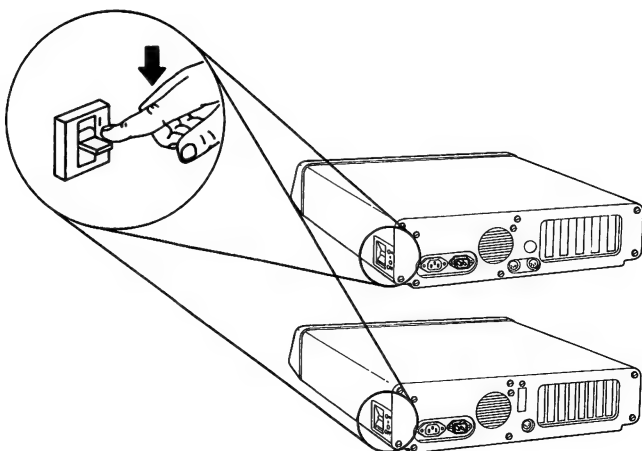
- 1** Remove the Diagnostics diskette from the back of this manual.



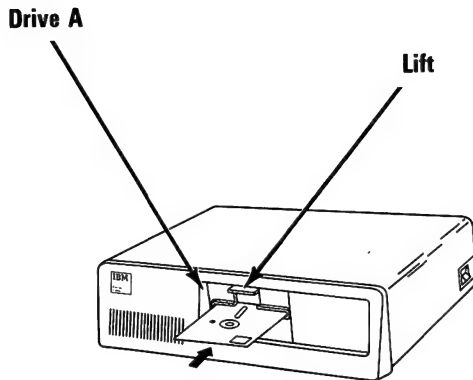
- 2** Set the Power switch on the system unit (and expansion unit, if attached) to Off.

| Is the International symbol for On.

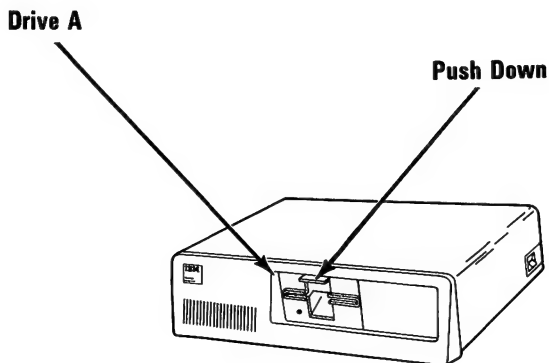
O Is the International symbol for Off.



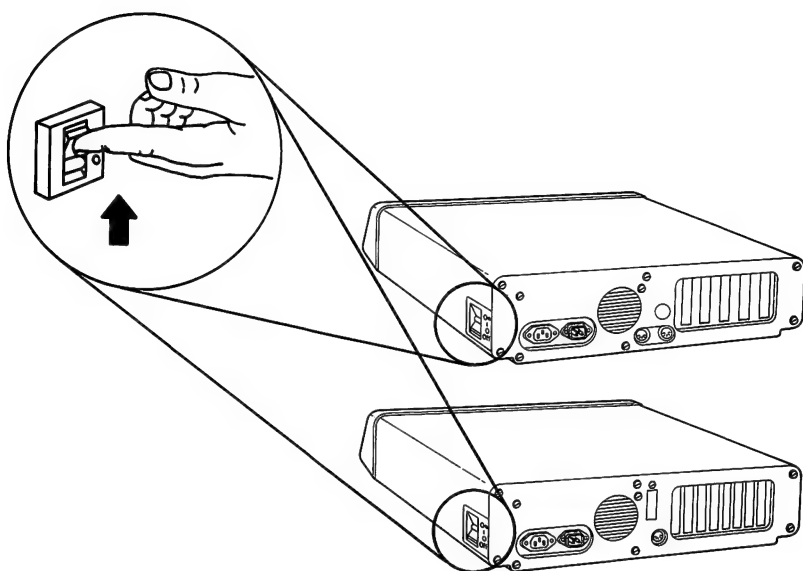
- 3** Set the Power switches on all attached devices to Off.
- 4** Lift the diskette-drive load lever.
- 5** Insert the Diagnostics diskette into drive A.



- 6** Push the load lever down.



- 7** Set the Power switches on all attached devices to On.
- 8** If an expansion unit is attached, set its Power switch to On.
- 9** Set the system unit's Power switch to On.



If you are using your TV or a non-IBM display with your system, and its screen image is similar to the one below, do the step following the figure to correct the problem.



Note: If the alignment on any IBM display is incorrect, have it serviced.

e IBM Personal Computer DIAGNOSTICS
rsion XXX (C) Copyright IBM Corp XXXX

LECT AN OPTION

- RUN DIAGNOSTIC ROUTINES
- FORMAT DISKETTE
- COPY DISKETTE
- PREPARE SYSTEM FOR RELOCATION
- EXIT TO SYSTEM DISKETTE

TER THE ACTION DESIRED

10 Press function key  to move the presentation to the right, or  to move the presentation to the left, as appropriate.

Your screen should match the one shown in the figure below. If it does, remove the Diagnostics diskette and return it to the back of the manual. If not, have your TV or non-IBM display serviced.

**The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX**

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES

1 - FORMAT DISKETTE

2 - COPY DISKETTE

3 - PREPARE SYSTEM FOR RELOCATION

9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

?

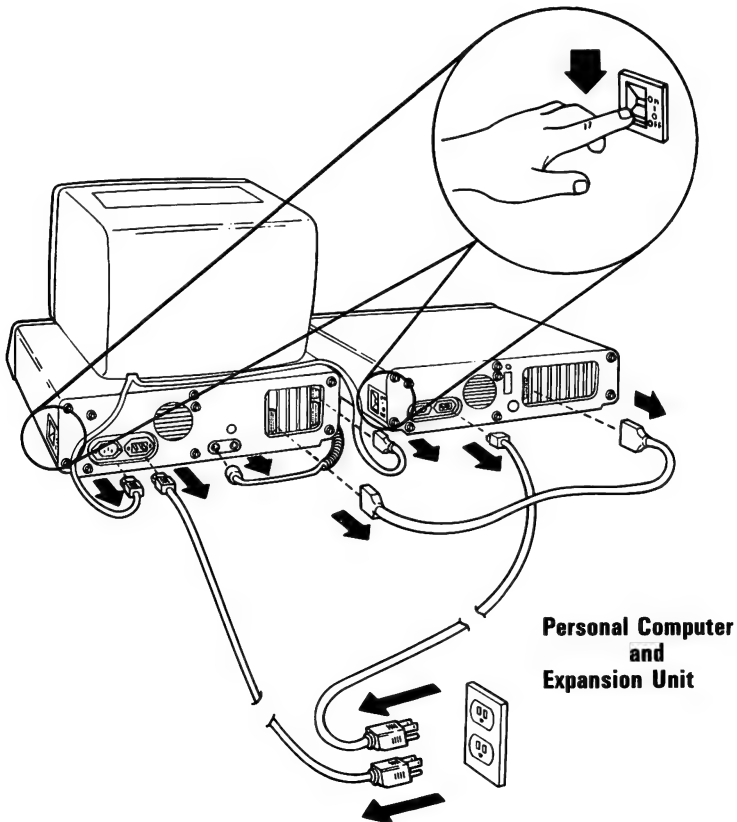
Continue with the next Test.

Notes:

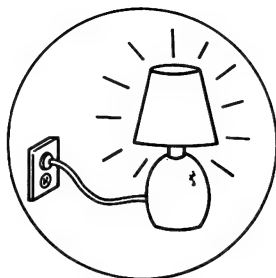


Checking Electrical Connections

- 1** Set the Power switch on the system unit (and expansion unit, if attached) to Off.
- 2** Set the Power switches on all attached devices to Off.
- 3** Disconnect all devices.
- 4** Unplug the system unit's (and expansion unit's) power cord from the wall outlet.

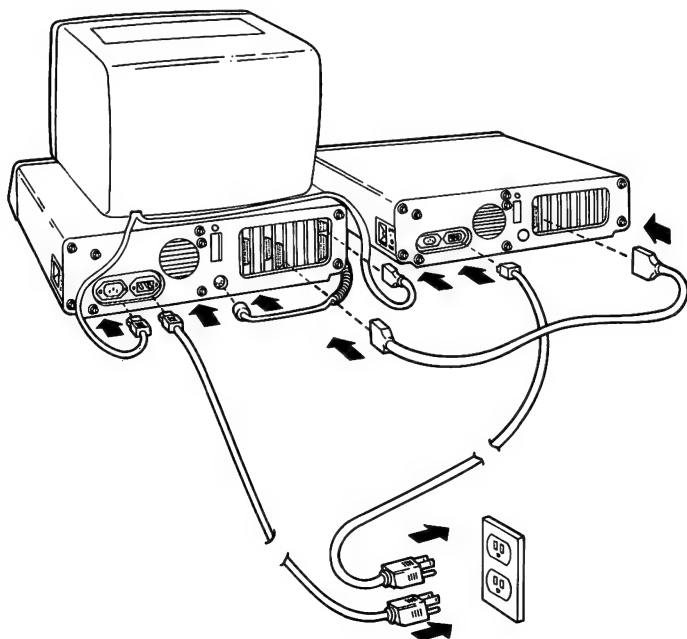


- 5** Check the wall outlet by plugging in a working lamp.



Outlet O.K.

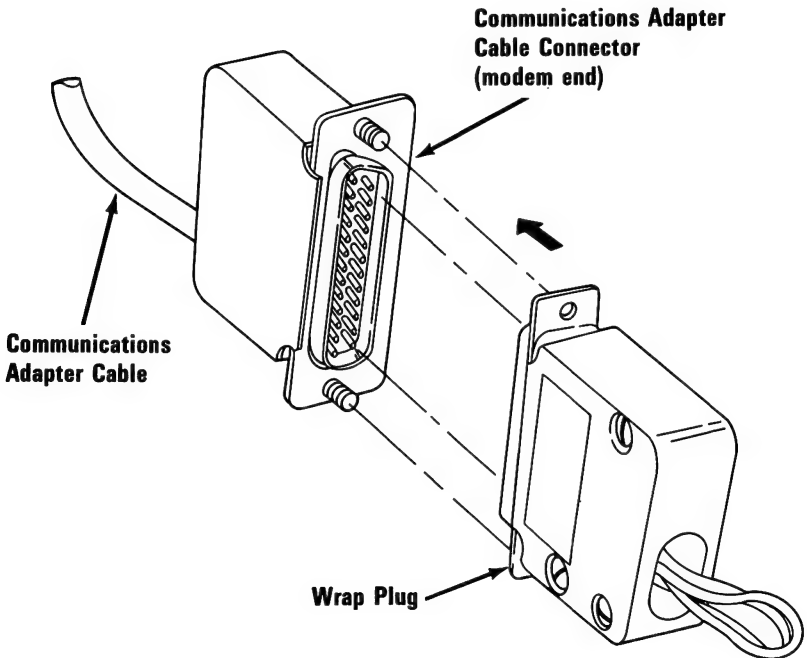
- 6** Connect each cable to the proper connector on the system unit (and expansion unit, if attached) to ensure correct electrical connection.
- 7** Plug the system unit's (and expansion unit's) power cord into the wall outlet.



Note: If you do not have an IBM Communications Adapter Cable attached to your system unit, go to the next page.

8 If you have an IBM Communications Adapter Cable, it came with a wrap plug. Disconnect the Communications Adapter Cable at the modem end (refer to the Communications Adapter Cable's "Option Installation Instructions" for the cable-removal procedure).

9 See the figure below and install the wrap plug (IBM part number 8529280) on the modem end of the cable (end farthest from the system unit).

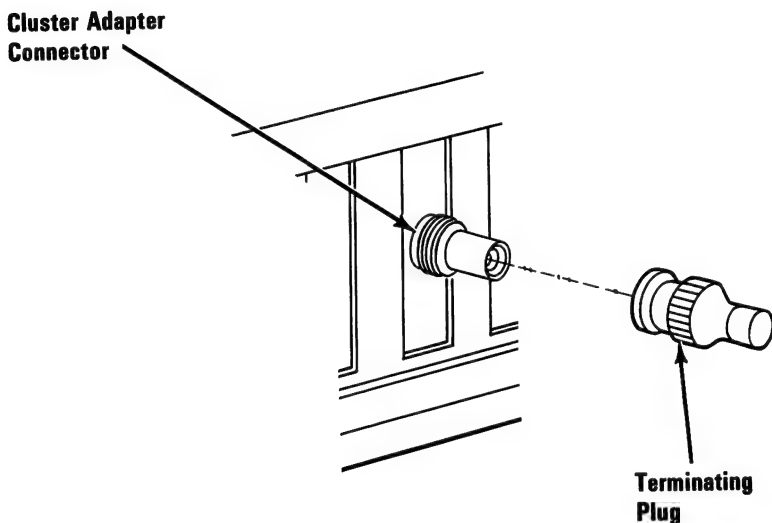


Note: If you do not have an IBM Cluster Adapter, continue with "Power-On Self Test (POST)" on the following page.

10 If you have an IBM Cluster Adapter, it came with a terminating plug. Disconnect the coaxial cable from the Cluster Adapter's connector.

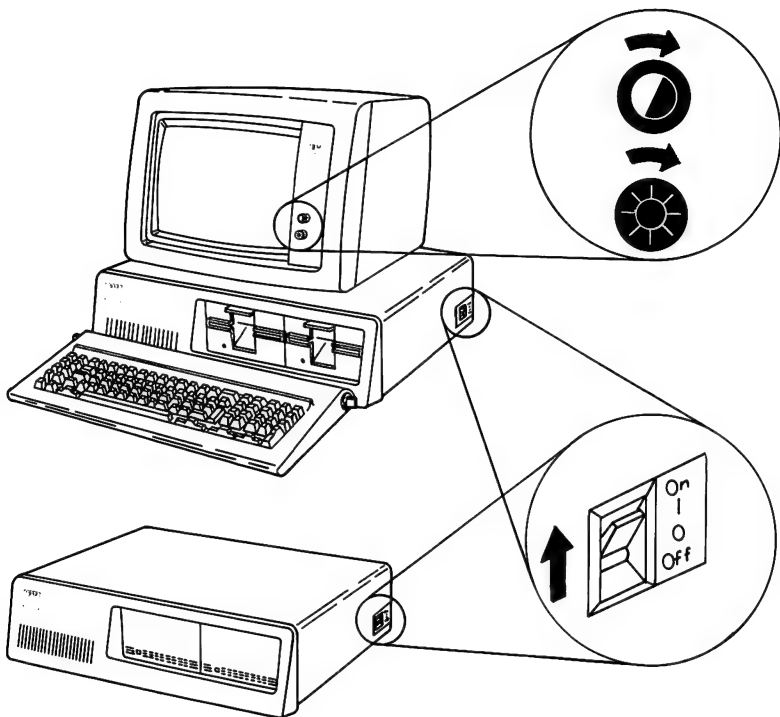
11 Refer to the figure below and install the terminating plug (IBM part number 6323481) on the Cluster Adapter's connector.

Continue with "Power-On Self Test (POST)" on the following page.



Power-On Self Test (POST)

- 1 Turn the Brightness and Contrast controls fully clockwise. When the first screen presentation appears, adjust the controls for eye comfort.

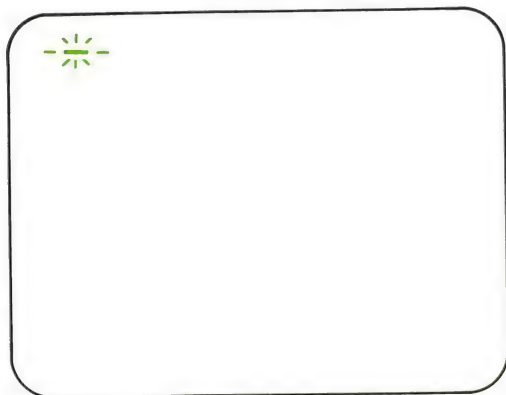


- 2 Set the Power switches on all attached devices to On.
- 3 If the expansion unit is attached, set its Power switch to On.
- 4 Set the system unit's Power switch to On.

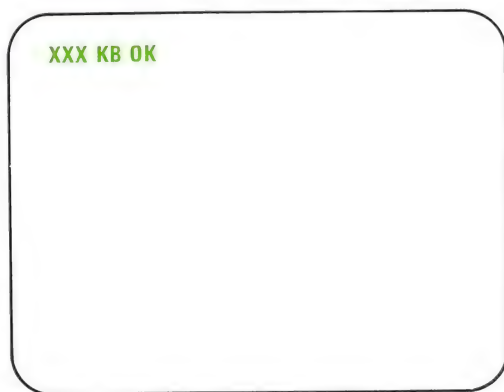
POST will finish in 13 to 90 seconds, depending on the amount of memory in your system. Normally, you will receive the following responses:

- A Look in the upper left-hand corner of the screen during POST.

If you have the Personal Computer, a blinking cursor should appear.



If you have the Personal Computer XT, a number should appear and continue to increase in value until it equals the amount of memory in your system.



- B** One short beep will be heard when the test finishes successfully.
- C** The “IBM Personal Computer BASIC” message should appear. (If, at the end of POST, a program from a diskette, or an operating system from the fixed disk drive, is automatically loaded, the first screen presentation of the program or operating system should appear).

The IBM Personal Computer Basic
Version CX.XX Copyright IBM Corp. XXXX
XXXXXX Bytes free
Ok

1LIST 2RUN 3LOAD" 4SAVE 5CONT 6LPT1 '7TRON 8TROFF 9KEY 0SCREEN

Did A, B, and C occur?

YES - Go to “Formatting a Diskette” on page Start 40-1.

NO - Personal Computer users go to “Personal Computer POST Errors” on the next page.

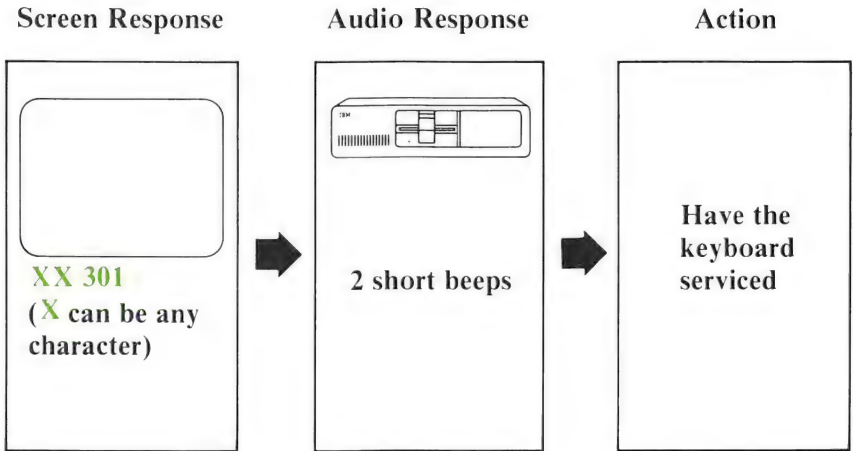
Personal Computer XT users go to “Personal Computer XT POST Errors” on Start 30-8.

Personal Computer POST Errors

In the following examples, find your screen response and audio response, then follow the instructions in the box marked "Action."

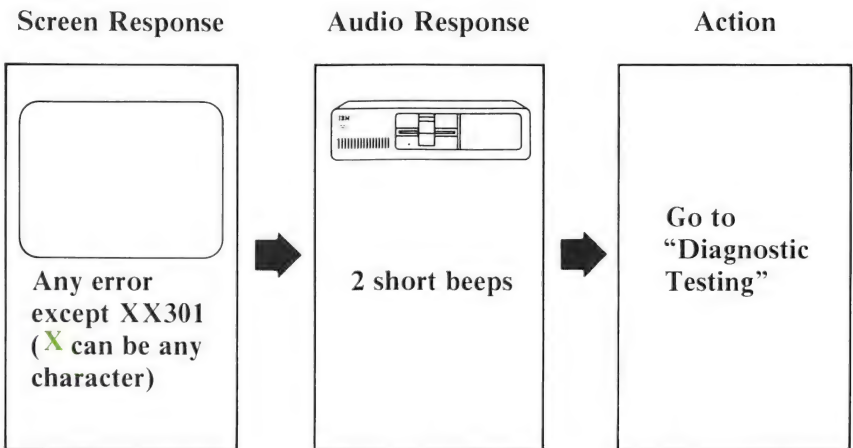
Warning: If the instructions are to have a unit serviced, and that unit has a fixed disk drive, we recommend that you back up all disk files onto diskettes. Normal shipping and handling can result in permanent loss of data on your fixed disk drives. Refer to the IBM *DOS* manual for a description of the Backup command.

Example 1

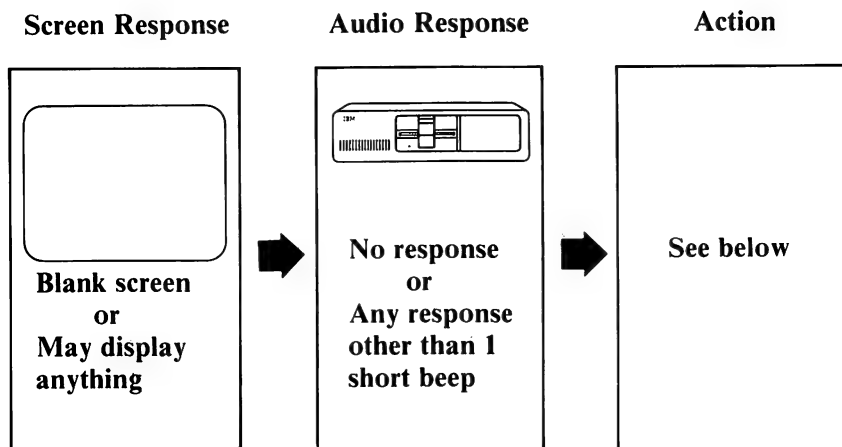


Note: Ensure the keyboard is connected correctly and check for any objects or foreign material on the keyboard. If error 301 still appears after the keyboard has been serviced, have the system unit serviced.

Example 2



Example 3



Do you have an expansion unit attached?

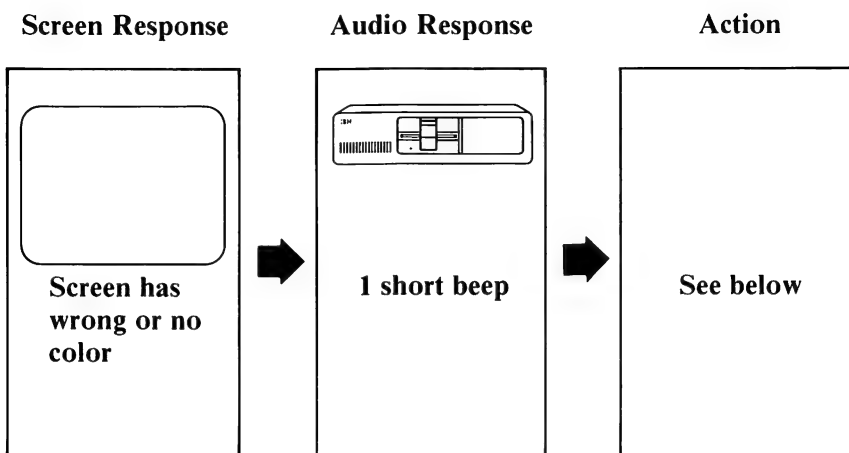
NO - Have the system unit serviced.

YES - Do the following:

1. Set the Power switches on the system unit and expansion unit to Off.
2. Set the Power switches on all attached devices to Off.
3. Disconnect the expansion unit cable from the system unit.
4. Set the Power switch on the system unit to On.

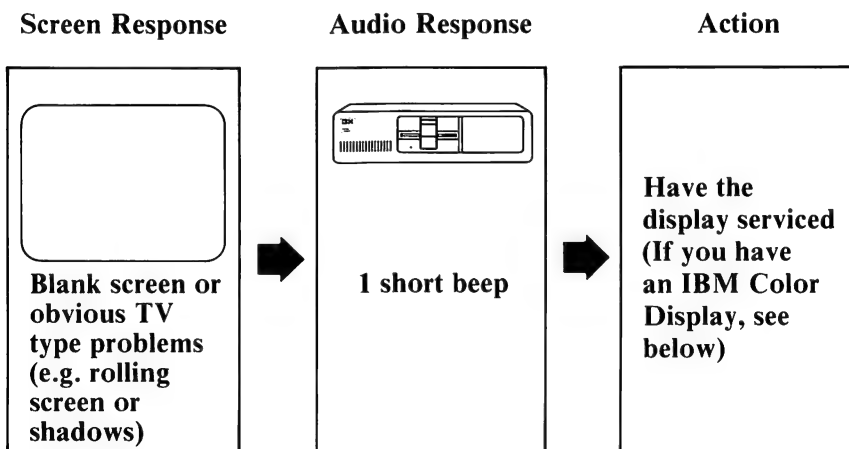
**If the error is the same, have the system unit serviced.
If the error changes, have the expansion unit and its
cable serviced.**

Example 4 (Color Display Only)



If you are using a TV as your display, verify that the color is correct by disconnecting your TV from the unit and operating the TV normally. Also, ensure your TV is compatible with the NTSC standard. If you have an IBM Color Display, go to Test 9000.

Example 5



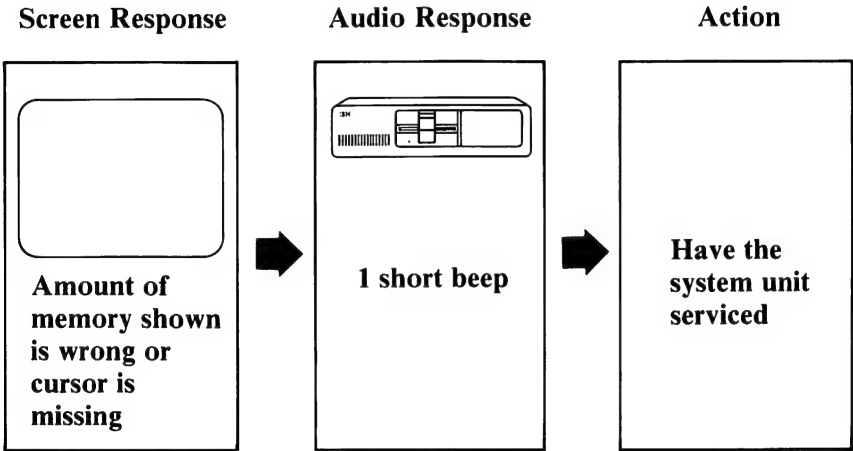
If you have an IBM Color Display, go to Test 9000.

Personal Computer XT POST Errors

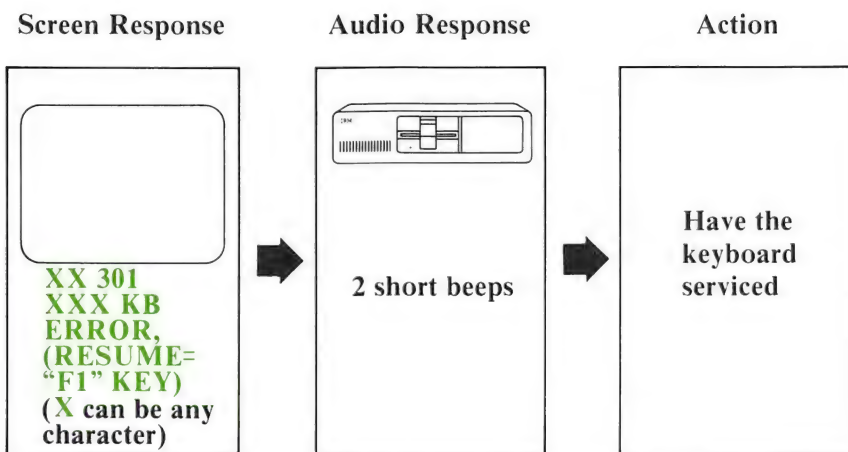
In the following examples, find your screen response and audio response, then follow the instructions in the box marked "Action."

Warning: If the instructions are to have a unit serviced, and that unit has a fixed disk drive, we recommend that you back up all disk files onto diskettes. Normal shipping and handling can result in permanent loss of data on your fixed disk drives. Refer to the IBM *DOS* manual for a description of the Backup command.

Example 1

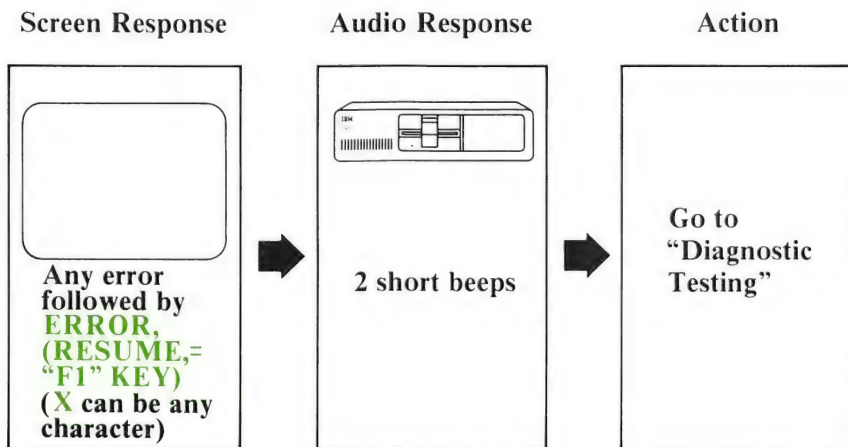


Example 2

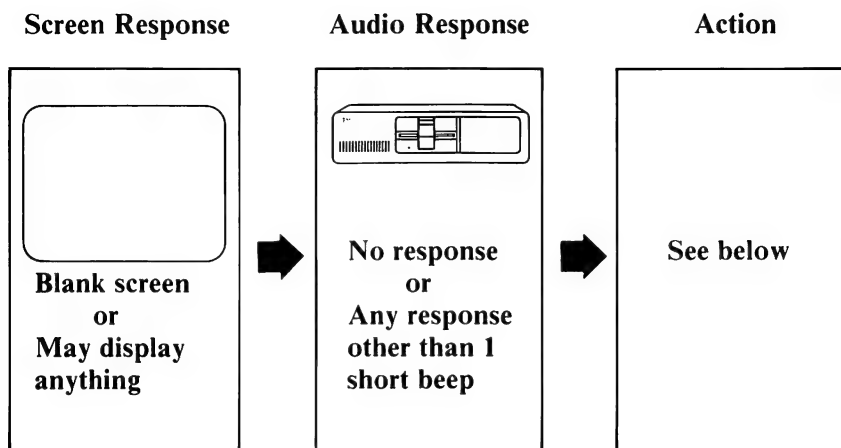


Note: Ensure the keyboard is connected correctly and check for any objects or foreign material on the keyboard. If error 301 still appears after the keyboard has been serviced, have the system unit serviced.

Example 3



Example 4



Do you have an expansion unit attached?

NO - Have the system unit serviced.

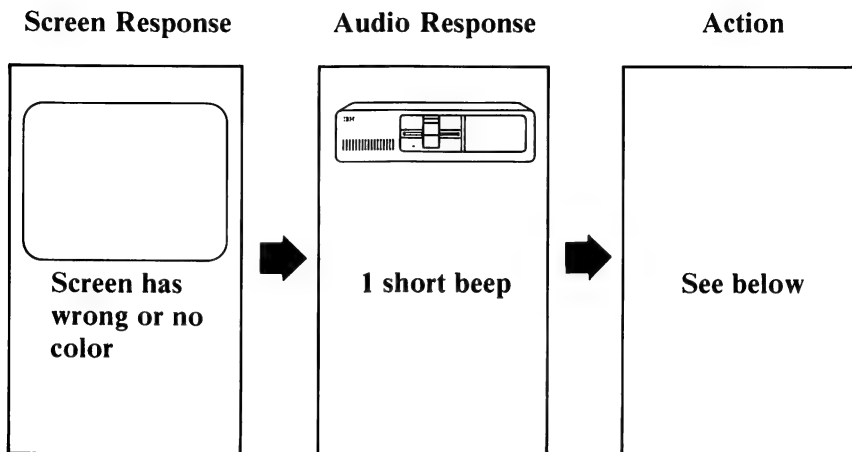
YES - Do the following:

1. Set the Power switches on the system unit and expansion unit to Off.
2. Set the Power switches on all attached devices to Off.
3. Disconnect the expansion-unit cable from the system unit.
4. Set the Power switch on the system unit to On.

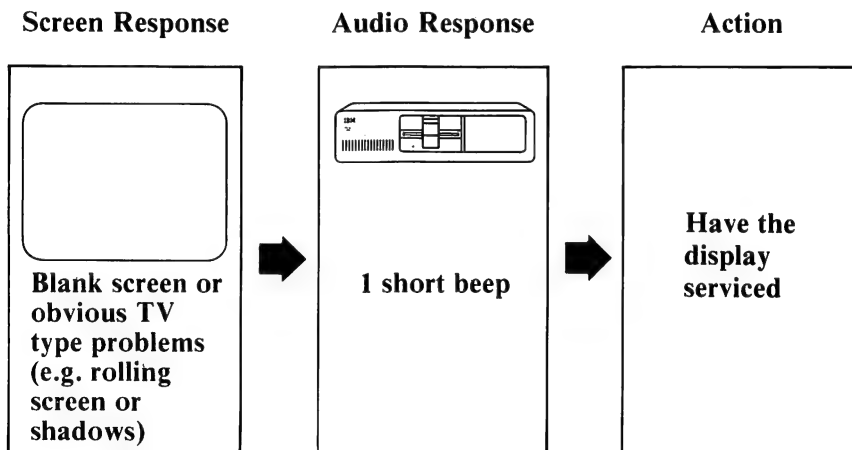
If the error is the same, have the system unit serviced.

If the error changes, have the expansion unit and its cable serviced.

Example 5 (Color Display Only)



If you are using a TV as your display, verify that the color is correct by disconnecting your TV from the unit and operating the TV normally. Also, ensure your TV is compatible with NTSC standard. If you have an IBM Color Display, go to Test 9000.



If you have an IBM Color Display, go to Test 9000.

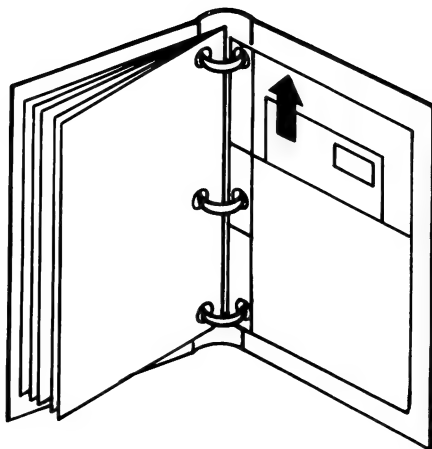
Notes:



Formatting a Diskette

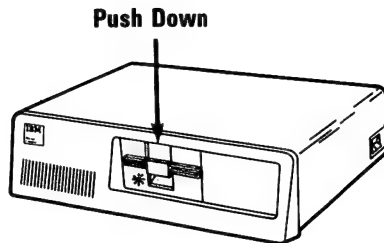
During the diagnostic tests that follow, you will need a scratch diskette (a *scratch* diskette is a formatted diskette with no data on it). If you already have a scratch diskette, skip this section and proceed to Diagnostic Testing on page Test 000-1. If you do not have a scratch diskette, continue with this procedure.

- 1** Remove the Diagnostics diskette from the back of this manual.



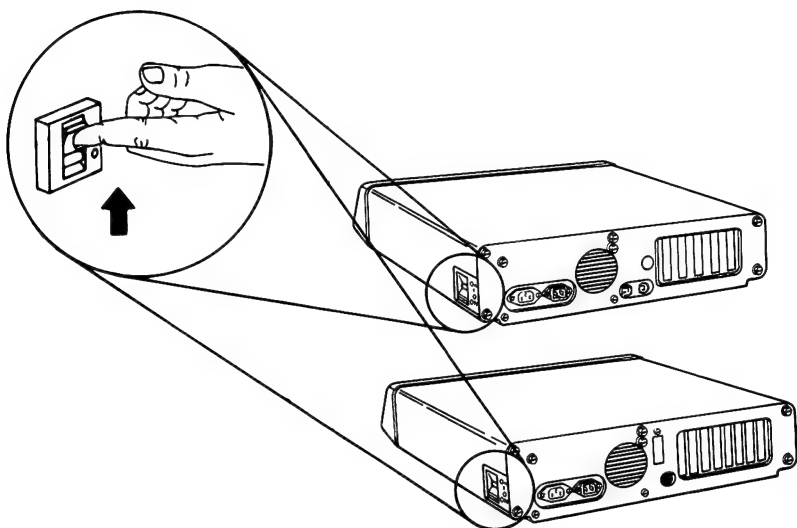
- 2** Set the Power switch on the system unit (and expansion unit, if attached) to Off.

- 3** Set the Power switches on all attached devices to Off.
- 4** Lift the diskette drive's load lever and insert the Diagnostics diskette into drive A.
- 5** Push the load lever down.



If you have trouble inserting your diskette, turn to the operating section of your *Guide to Operations* for more information.


- 6** Set the Power switches on all attached devices to On.
- 7** If an expansion unit is attached, set its Power switch to On.
- 8** Set the Power switch on the system unit to On.



9 Did the following appear on your screen?

(X can be any character.)

XXXX
XXX KB OK
ERROR. (RESUME="F1" KEY)

YES - Press  , then go to the next step.

NO - Go to the next step.

10 Did the following appear on your screen?

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX
SELECT AN OPTION
0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE
ENTER THE ACTION DESIRED
?


YES - Go to the next step.

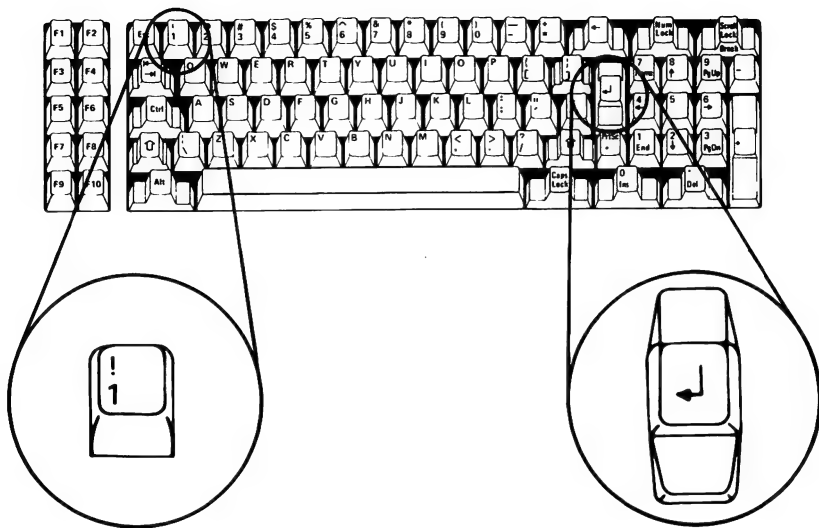
NO - Remove the diskette and verify that it:

- Is the Diagnostics diskette.
- Was inserted correctly.

If the Diagnostics diskette was inserted correctly, have the system unit serviced.

11 Press  to select **FORMAT DISKETTE**,

then 



Go to the next step.

12 Did the following appear on your screen?

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES

1 - FORMAT DISKETTE

2 - COPY DISKETTE



3 - PREPARE SYSTEM FOR RELOCATION

9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? 1

WHICH DRIVE CONTAINS DISKETTE
TO BE FORMATTED?

YES - Press  then  and go to the
next step.

NO - Have your system unit serviced.

13 Did the following appear on your screen?

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED


? 1

WHICH DRIVE CONTAINS DISKETTE
TO BE FORMATTED? A

INSERT DISKETTE TO BE FORMATTED
IN DRIVE A:

PRESS ENTER WHEN READY

YES - Remove the Diagnostics diskette from drive A, insert a blank diskette push the load lever down.

Press  and go to the next step.

NO - Have your system unit serviced.

14 The blank diskette will be formatted. When the In-Use light goes out, remove the scratch diskette and go to the next step.

- 15** Did the following appear on your screen after the diskette was formatted?

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES

1 - FORMAT DISKETTE

2 - COPY DISKETTE

3 - PREPARE SYSTEM FOR RELOCATION

9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? - ☼ -

- YES -** Continue with “Diagnostic Testing” on page Test 000-1.
- NO -** Return to Step 10 and try another blank diskette. Be sure you insert the diskette correctly. If the problem still exists, have the system unit serviced.

Notes:



Diagnostic Testing

During the diagnostic tests that follow, you will need a scratch diskette. If you do not have a scratch diskette, go to "Diskette Format Procedure" on page Start 40-1.

During the diagnostic tests, you may be asked to record an error message. This information is needed when you have your system serviced.

Following are examples of error messages you may receive. **A message ending in 00 means the test finished successfully.**

In the examples, X can be any character.

Example 1

XX:XX:XX
ERROR - SYSTEM UNIT XXXX

Example 2

XX:XX:XX
ERROR - EXPANSION UNIT XXXX

The unit in which your options are installed determines if the error message reads **SYSTEM UNIT** or **EXPANSION UNIT**.

Example 3

XX:XX:XX
XXX KB OK
ERROR.(RESUME="F!"KEY)

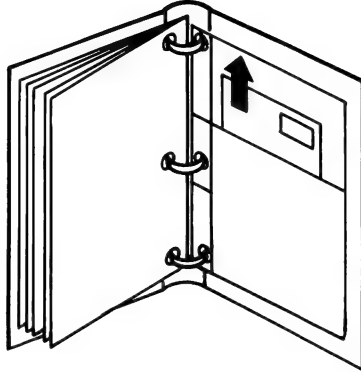
Warning: If the above message appears on your screen, it means the POST detected an error. The message also will appear if you have an expansion unit that is not connected to your system or that does not have its Power switch set to On.

Pressing the F1 key allows the system to bypass the error condition for the diagnostic tests, but your system may not function correctly unless it is serviced.

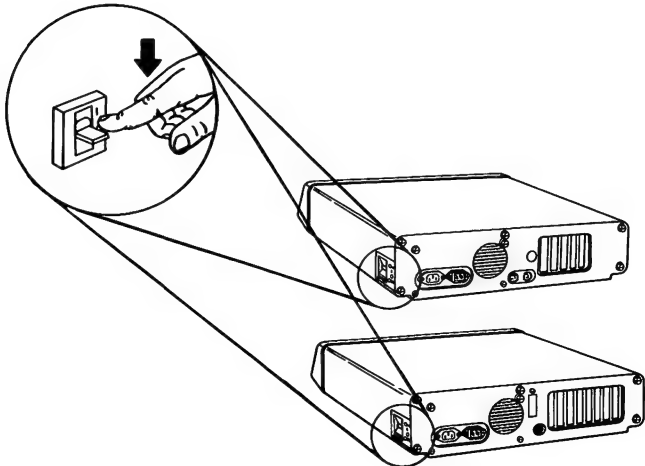
Continue with "Loading Diagnostics" on the next page.

Loading Diagnostics

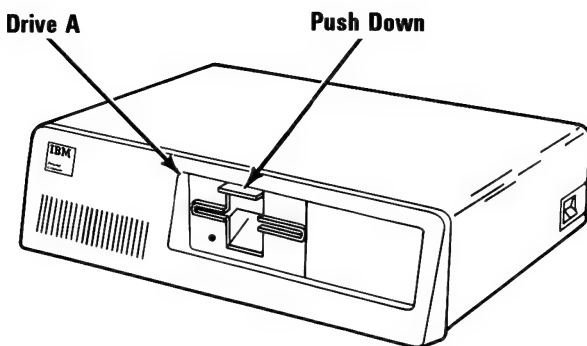
- 1** Remove the Diagnostics diskette from the back of this manual.



- 2** Set the Power switch on the system unit (and expansion unit, if attached) to Off.
- 3** Set the Power switches on all attached devices to Off.

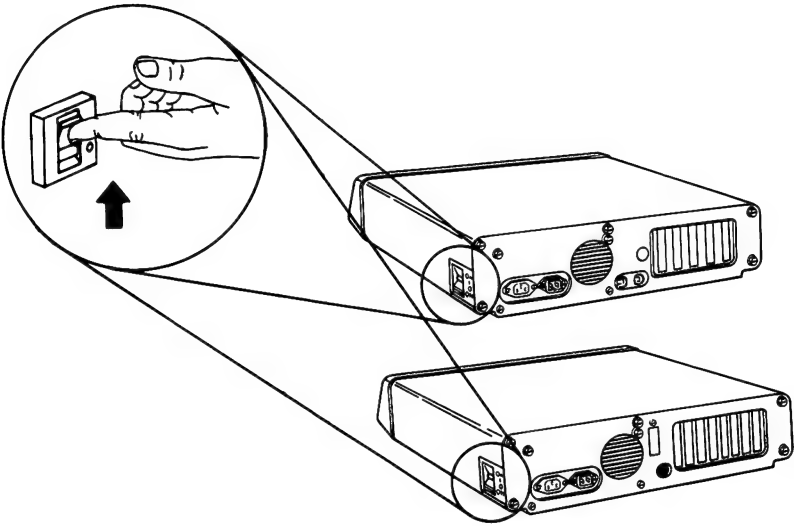


- 4** Raise the diskette drive's load lever and insert the Diagnostics diskette into drive A.
- 5** Push the load lever down.



If you have trouble inserting your diskette, turn to the operating section of your *Guide to Operations* for more information.


- 6 Set the Power switches on all attached devices to On.
- 7 If an expansion unit is attached, set its Power switch to On.
- 8 Set the Power switch on the system unit to On.



9

Did the following appear on your screen?

XXXX
XXX KB OK
ERROR. (RESUME= "F1" KEY)

YES - Press  , then go to the next step.

NO - Go to the next step.

10 Did the following appear on your screen?

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX
SELECT AN OPTION
0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE
ENTER THE ACTION DESIRED
?



YES - Go to the next step.

NO - Remove the diskette and verify that it:

- Is the Diagnostics diskette.
- Was inserted correctly.

If the Diagnostics diskette was inserted correctly, have the system unit serviced.

Note: If you are using your TV or a non-IBM display, you could experience data errors when you operate your diskette drive. To correct this problem, move your TV or display a minimum of 30 cm (12 in.) away from your system unit.

11 Press , then  to select

RUN DIAGNOSTIC ROUTINES.

**The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX**

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES

1 - FORMAT DISKETTE

2 - COPY DISKETTE

3 - PREPARE SYSTEM FOR RELOCATION


9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

?

Note: Depending on the configuration of your system, questions about attached devices may appear on your screen.

Press  or  as required,

then press  .

- 12** Complete the list of installed devices and options and show their locations with check marks. Also enter the amount of memory you have in your system. Then go to the next step.

System Unit	Expansion Unit	Installed Device/Option
		System Board
		Expansion Option
		XXX KB of Memory
		Keyboard
		Monochrome and Printer Adapter
		X Diskette Drive(s) and Adapter
		Math Coprocessor
		X Fixed Disk Drive(s) and Adapter
		Asynchronous Communications Adapter

Installed Devices, Options, and Memory

In the following sample, **S** means the device or option is installed in the system unit, and **E** means it is installed in the expansion unit.



- 13** Does the screen presentation correctly list all the installed devices and options?



THE INSTALLED DEVICES ARE


S SYSTEM BOARD
S 256KB MEMORY
S KEYBOARD
S COLOR/GRAPHICS MONITOR ADAPTER
S 2 DISKETTE DRIVE(S) AND ADAPTER
E PRINTER ADAPTER
S ASYNCHRONOUS COMMUNICATIONS ADAPTER
S MATRIX PRINTER

IS THE LIST CORRECT (Y/N)?

Note: The IBM Communications Cable and the Printer Cable will not appear in the list, and the Graphics Printer will be listed as "Matrix Printer." The Game Control Adapter may not be listed if the joysticks or paddles are not connected when the Power switch is set to On.

YES - Press  then  and go to the next step.

NO - Press  then , and record the error message. If your printer was not

listed, press  and go to the next

step. If any other device or option was not listed, have the unit that contains that option serviced.

14 Press  to select **RUN TESTS ONE TIME**,

then  .

SYSTEM CHECKOUT

0 - RUN TESTS ONE TIME

1 - RUN TESTS MULTIPLE TIMES

2 - LOG UTILITIES

9 - EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED

?

The diagnostic programs have successfully loaded. Continue with the tests on the following pages to perform a complete system checkout.

Notes:

Test 100

Did you receive a **SYSTEM UNIT 100** message, as shown below?

SYSTEM UNIT 100
THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY

YES - Your system has completed this test successfully. Continue with the next Test.

NO - Have the system unit serviced.

Notes:

Test 200

1 Do you have an IBM Expansion Unit attached to your system?

NO - Continue with the next Test, Test 300.

YES - Did you receive an **SYSTEM UNIT 1800** message, as shown below?

SYSTEM UNIT 100
SYSTEM UNIT 1800

THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY

YES - Your system has completed this test successfully. Continue with the next test, Test 300.

NO - Go to the next step.

2

Did you receive an **1819** error message, as shown below?



SYSTEM UNIT 100
XX:XX:XX
ERROR EXPANSION UNIT 1819
PRESS ENTER TO CONTINUE
?

YES - Have the expansion unit and its cable serviced.

NO - Go to the next step.

3

Did you receive an 1820 or 1821 error message?

SYSTEM UNIT 100

XX:XX:XX

ERROR EXPANSION UNIT 182X

PRESS ENTER TO CONTINUE

?


YES - Have the expansion unit and its cable serviced.

NO - Do the following:

1. Set the Power switches on the system unit and expansion unit to Off.
2. Set the Power switches on all attached devices to Off.
3. Disconnect the expansion-unit cable from the system unit.
4. Set the Power switch on the system unit to On.
5. Go to the next step.

- 4** When the POST finished, did the following appear on your screen?

1801
XXX KB OK
ERROR. (RESUME = "F1" KEY)

YES - Press  and go to the next step.

NO - Go to the next step.

5

Press



, then



to select

RUN DIAGNOSTIC ROUTINES.

The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES

1 - FORMAT DISKETTE

2 - COPY DISKETTE

3 - PREPARE SYSTEM FOR RELOCATION

9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? -  -

Note: Depending on the configuration of your system, questions about attached devices may appear on your screen.

Press  or  as required,

then press





.

- 6 Are any of the options or devices installed in your expansion unit missing from the list?

THE INSTALLED DEVICES ARE


S SYSTEM BOARD
S 256KB MEMORY
S KEYBOARD
S COLOR/GRAPHICS MONITOR ADAPTER
S 2 DISKETTE DRIVE(S) AND ADAPTER
E PRINTER ADAPTER
S ASYNCHRONOUS COMMUNICATIONS ADAPTER
S MATRIX PRINTER
IS THE LIST CORRECT (Y/N)?

Note: The IBM Communications Cable and the Printer Cable will not appear in the list, and the Graphics Printer will be listed as "Matrix Printer." The Game Control Adapter may not be listed if the joysticks or paddles are not connected when the Power switch is set to On.

YES - Press  then  and go to the next step.

NO - Have the system unit serviced.

7

Press  to select

RUN TESTS ONE TIME, then .

SYSTEM CHECKOUT

0 - RUN TESTS ONE TIME

1 - RUN TESTS MULTIPLE TIMES

2 - LOG UTILITIES

9 - EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED

?

Did you get an **1820** error message?

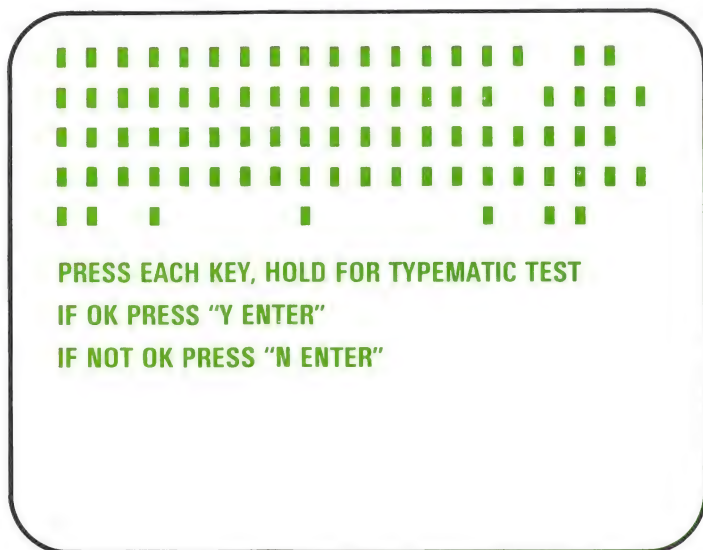
YES - Have the expansion unit and its cable serviced.

NO - Have the system unit serviced.



Notes:

Test 300

- 1 After approximately 2 minutes, did the following appear on your screen?



YES - Press each key once, then go to the next step.

NO - Press  then . Record the error message. Have the system unit serviced.

2

Did all the blocks change to characters as shown below?

```

1 2 ← 1 2 3 4 5 6 7 8 9 Ø - = ↔ N S
3 4 L Q W E R T Y U I O P [ ] 7 8 9 -
5 6 C A S D F G H J K L ; ' ` R 4 5 6
7 8 S \ Z X C V B N M , . / S * 1 2 3 +
9 0 A S C Ø .

```

PRESS EACH KEY HOLD FOR TYPOMATIC TEST

IF OK PRESS "Y ENTER"

IF NOT OK PRESS "N ENTER"

YES - Press and hold any key. The corresponding character on the screen will blink. This is the typematic test.

If the typematic test works correctly,

press  then  and go to the

next test. If the typematic test fails,

press  then . Record the

error message. Have the keyboard serviced.

NO - Have the keyboard serviced.

Test 400

1 Do you have an IBM Monochrome Display and Printer Adapter installed in your system?

NO - Continue with the next Test.

YES - Did the following appear on your screen?



XX:XX:XX
ERROR SYSTEM UNIT 4XX

NO - Continue with the next step.

YES - Record the error message and have the unit that contains the adapter serviced.

2

Do you have an IBM Monochrome Display attached to the IBM Monochrome Display and Printer Adapter installed in your system?

NO - Continue with the next Test.

YES - Did the following appear on your screen?

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.



THIS LINE IS INTENSIFIED.



THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING

THIS LINE IS UNDERLINED

IS THE SCREEN CORRECT? (Y/N)

YES - Press  then  and go to the next step.

NO - Press  then  . Record the error message and have the unit that contains the adapter serviced.

3



Did the following appear on your screen?



CHARACTER SET

0 1 2 3 4 5 6 7 8 9 : ; = > ?
 [\] ^ _ ` { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨
 © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾
 À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï
 Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â
 ã ä å æ ç è é ê ë ì í î ï ð ñ ò
 ó ô õ ö ÷ ø ù ú û ü ý þ ÿ



IS THE SCREEN CORRECT? (Y/N)

YES - Press  then  and go to the next step.

NO - Press  then . Record the





error message and have the unit that contains the adapter serviced.

80X25 DISPLAY

```

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPE
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRE
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRST
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTL
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUV
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVV
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWV
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWXY
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWXYZ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWXYZ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWXYZ\
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOQRSTUVWXYZ\ :

```

IS THE SCREEN CORRECT? (Y/N)**YES -** Press  then  . Your systemhas completed this test successfully.
Continue with the next Test.**NO -** Press  then  . Record theerror message and have the unit that
contains the adapter serviced.

Test 500

1 Do you have a color display or TV attached to your system?

NO - Continue with the next Test.

YES - Did the following appear on your screen?

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.



THIS LINE IS INTENSIFIED.



THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.

	BLUE
	GREEN
	CYAN
	RED
	MAGENTA
	YELLOW
	WHITE

IS THE SCREEN CORRECT ? (Y/N)

YES - Press  then  and go to the next step.



NO - Press  then  . Record the error message and have the unit that contains the adapter serviced.

3 Did the following appear on your screen?

80X25 DISPLAY

```
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O
" # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P
# $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q
$ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R
% & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S
& ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T
' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U
( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W
* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X
+ , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y
, - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
- . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \
. / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ]
/ 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^
```

IS THE SCREEN CORRECT? (Y/N)

YES - Press  then  and go to the next step.

NO - Press  then  . Record the



error message and have the unit that contains the adapter serviced.

4 Did the following appear on your screen?

40X25 DISPLAY

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
```

IS THE SCREEN CORRECT? (Y/N)

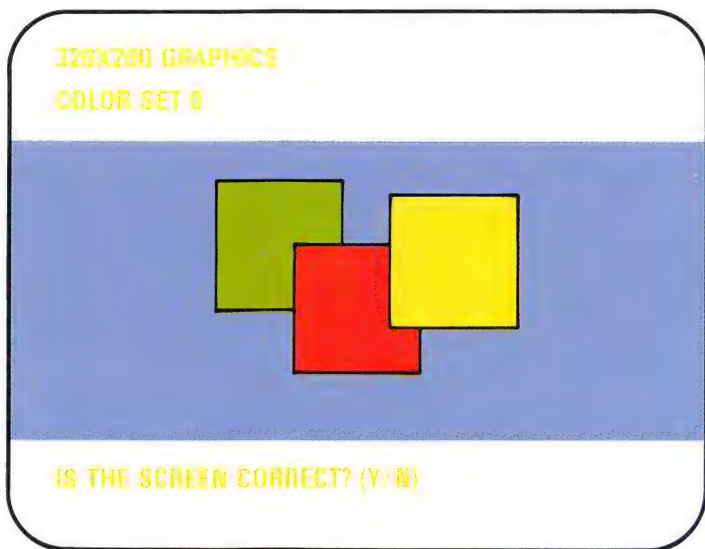
YES - Press  then  and go to the next step.



NO - Press  then . Record the



error message and have the unit that contains the adapter serviced.

5

Did the following appear on your screen, with the correct colors?

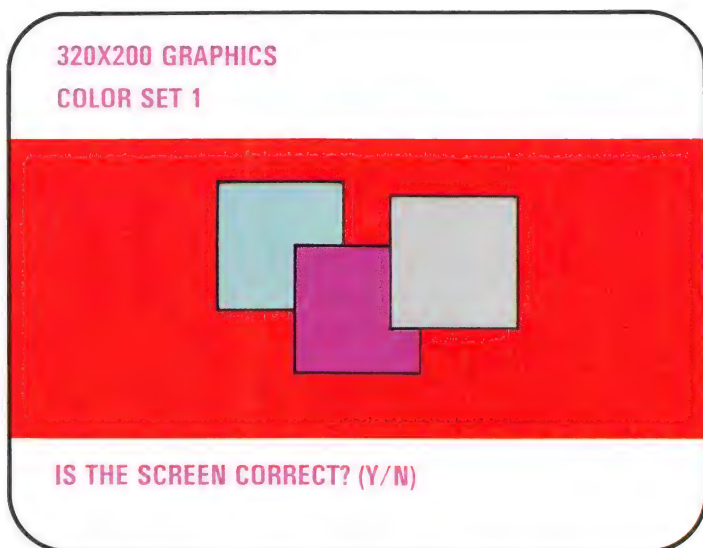




YES - Press  then  and go to the next step.



NO - Press  then  . Record the

error message and have the unit that contains the adapter serviced.

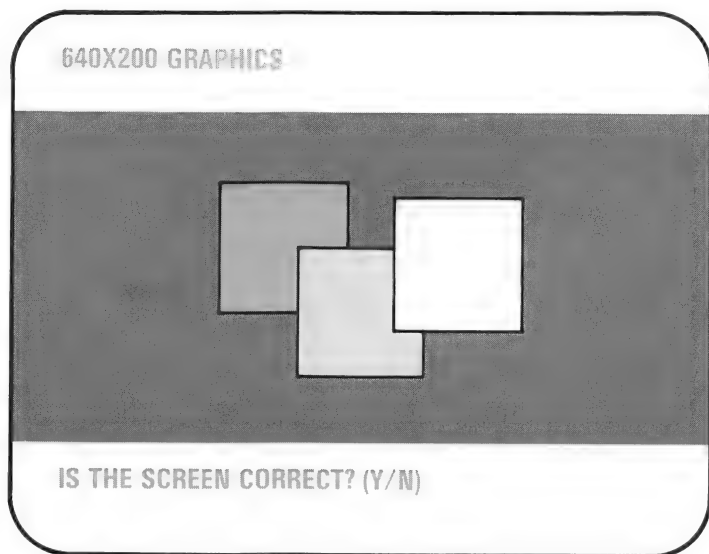
- 6 Did the following appear on your screen, with the correct colors?







YES - Press  then  and go to the next step.

NO - Press  then . Record the error message and have the unit that contains the adapter serviced.

7 Did the following appear on your screen?





YES - Press  then  and go to the next step.

NO - Press  then  . Record the error message and have the unit that contains the adapter serviced.

TYPE ANY KEY TO DISPLAY NEXT PAGE

YES - Go to the next step.

NO - Press  then  . Record the



error message and have the unit that contains the adapter serviced.

9 There are 8 video pages. Press any key; “VIDEO PAGE 1” appears. Continue to press any key until “VIDEO PAGE 0” appears.



10 Did all 8 pages appear?

VIDEO PAGE 0

WERE ALL 8 PAGES DISPLAYED? (Y/N)

YES - Press  then . Your system

**has completed this test successfully.
Continue with the next Test.**

NO - Press  then . Record the

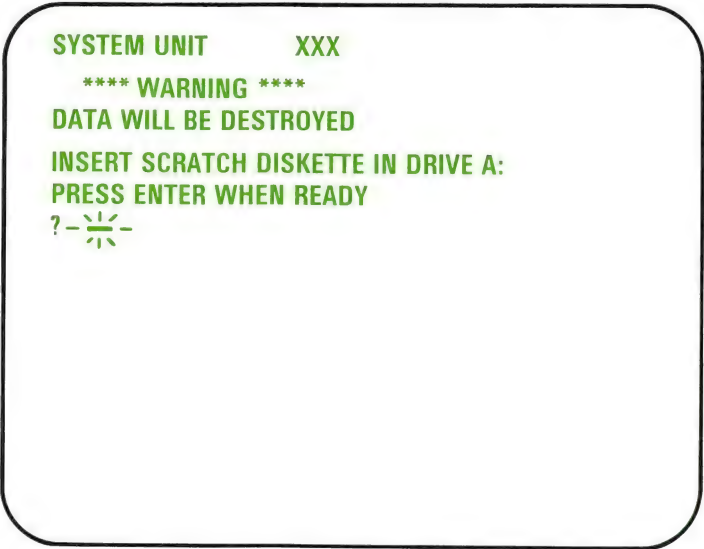
error message and have the unit that contains the adapter serviced.

Notes:



Test 600

- 1 Remove the Diagnostics diskette.
- 2 Does your screen match the one shown in the figure below?



SYSTEM UNIT XXX
**** WARNING ****
DATA WILL BE DESTROYED
INSERT SCRATCH DISKETTE IN DRIVE A:
PRESS ENTER WHEN READY
?- ☼ -

YES - Go to the next step.



NO - Record the error message and have the system unit serviced.

3 Insert a scratch diskette into drive A,

and press .

4 Did the following appear on your screen and is the drive type correct?

**DISKETTE DRIVE A: IS DOUBLE SIDED
IS THE DISKETTE DRIVE TYPE
CORRECT - (Y/N)?**


YES - Press  then . If you have

two diskette drives installed in your system, go to the next step. If you have only one diskette drive, your system has completed this test successfully. Continue with the next Test.

NO - Have the system unit serviced.

5 Did the following appear on your screen?



*** WARNING ***
DATA WILL BE DESTROYED
INSERT SCRATCH DISKETTE IN DRIVE B
PRESS ENTER WHEN READY
? - ☼ -

YES - Remove the scratch diskette from drive
A, place it in drive B, and press .
Go to the next step.

NO - Have the system unit serviced.

- 6** Did the following appear on your screen and is the drive type correct?

**DISKETTE DRIVE B: IS DOUBLE SIDED
IS THE DISKETTE DRIVE TYPE
CORRECT - (Y/N)?**

YES - Press  then  . Your system

has completed this test successfully.
Continue with the next Test.

NO - Have the system unit serviced.

Test 700

1 Do you have an IBM Math Coprocessor installed in your system?

NO - Continue with the next Test.

YES - Did the following appear and remain on your screen for more than 10 seconds?

SYSTEM UNIT

600

YES - Have the system unit serviced.

NO - Go to the next step.

2

Did the following appear on your screen?

XX:XX:XX

ERROR - SYSTEM UNIT

7XX

YES - Have the System unit serviced.

NO - Your system has completed this test successfully. Continue with the next Test.

Test 900

Do you have an IBM Printer Adapter installed in your system?

NO - Continue with the next Test.

YES - Did either of the following error messages appear on your screen?

XX:XX:XX
ERROR - SYSTEM UNIT 9XX

XX:XX:XX
ERROR EXPANSION UNIT 9XX

YES - Have the unit that contains the adapter serviced.

NO - Your system has completed this test successfully. Continue with the next Test.

Notes:

Test 1100

Do you have an IBM Asynchronous Communications Adapter installed in your system?

NO - Continue with the next Test.

YES - Did any of the following error messages appear on your screen?

XX:XX:XX ERROR - SYSTEM UNIT	11XX
XX:XX:XX ERROR - SYSTEM UNIT	12XX
XX:XX:XX ERROR EXPANSION UNIT	11XX
XX:XX:XX ERROR EXPANSION UNIT	12XX

YES - Have the unit that contains the adapter serviced.

NO - Your system has completed this test successfully. Continue with the next Test.

Notes:



Test 1300

1

Do you have an IBM Game Control Adapter installed in your system?



NO - Continue with the next Test.

YES - Did the following appear on your screen?

**DO YOU HAVE JOYSTICKS, PADDLES,
OR NOTHING ATTACHED (J P N)?**

YES - For joysticks press  then  and go to Step 2.

For paddles press  then  and go to Step 5.

For nothing press  then 

and continue with the next Test.

NO - Continue with the next Test.

2 Press  then  .

3 Check for correct operation of your joysticks as follows:

1. Press each button and watch the word **RELEASED** change to **PRESSED**.
2. Move each joystick and watch the character **A** or **B** move inside the box.

HOW MANY BUTTONS DO YOU HAVE (2/4)? 2

BUTTON A

RELEASED

* *

* *

* A *

* *

* *

BUTTON B

RELEASED

* *

* *

* B *

* *

* *



PRESS AND RELEASE ALL BUTTONS,
EXERCISE ALL JOYSTICKS/PADDLES
AND PRESS ANY KEY WHEN DONE


4

Did all buttons and joysticks operate correctly?


YES - Your system has completed this test successfully. Press any key and continue with the next Test.

NO - Have the joysticks and the unit in which the Game Control Adapter is installed serviced.

5 Press  or  for the number of

paddles attached to your Game Control Adapter
and press .

6 Press the same number for the number of

buttons and press .

7 Check for correct operation of your paddles as follows:

1. Press each button and watch the word **RELEASED** change to **PRESSED**.
2. Turn each paddle control and check that **A**, **B**, **C**, or **D** moves inside the box.

HOW MANY BUTTONS DO YOU HAVE (2/4)?

BUTTON A

BUTTON B

BUTTON C

BUTTON D

RELEASED

RELEASED

RELEASED

RELEASED

* A *

* B *

* C *

* D *

PRESS AND RELEASE ALL BUTTONS,
EXERCISE ALL JOYSTICKS/PADDLES
AND PRESS ANY KEY WHEN DONE

Go to the next step.

8

Did all buttons and paddle controls operate correctly?

YES - Your system has completed this test successfully. Press any key and continue with the next Test.

NO - Have the paddles and the unit in which the Game Control Adapter is installed serviced.

Notes:



Test 1500

Do you have an IBM Synchronous Data Link Control Adapter installed in your system?

NO - Continue with the next Test.

YES - Did either of the following error messages appear on your screen?

XX:XX:XX

ERROR - SYSTEM UNIT

15XX

XX:XX:XX

ERROR EXPANSION UNIT

15XX

YES - Have the unit that contains the adapter serviced.

NO - Your system has completed this test successfully. Continue with the next Test.

Notes:







Test 1700

1 Do you have a fixed disk drive installed in one of your units?

NO - Continue with the next Test.

YES - The following appears on your screen.

*** WARNING ***
DATA ON CYLINDER 305 WILL BE
OVERWRITTEN BY FIXED DISK WRITE TESTS
DO YOU WANT TO INCLUDE FIXED DISK
WRITE TESTS ON DRIVE C: (Y/N) ?

Press  and then  if you want to include fixed-disk write tests, or  and then  if you do not.
Go to the next step.

This test can take up to 5 minutes.

2 Did the following appear on your screen?

Note: If you pressed **N** (no write test), **PERFORMING WRITE TEST** will not appear.

*** WARNING ***
DATA ON CYLINDER 305 WILL BE
OVERWRITTEN BY FIXED DISK WRITE TESTS

DO YOU WANT TO INCLUDE FIXED DISK
WRITE TESTS ON DRIVE C: (Y/N) ? y
PERFORMING SEEK TEST
PERFORMING WRITE TEST
PERFORMING TRACK ZERO TEST
PERFORMING SURFACE SCAN
PLEASE STAND BY





YES - If you have one fixed disk drive, your system has successfully completed this test. Continue with the next Test. If you have two fixed disk drives, continue.

NO - Record the error message and have the unit that contains the fixed disk drive serviced.

3 Did the following appear on your screen?

*** WARNING ***
DATA ON CYLINDER 305 WILL BE
OVERWRITTEN BY FIXED DISK WRITE TESTS

DO YOU WANT TO INCLUDE FIXED DISK
WRITE TESTS ON DRIVE D: (Y/N) ?

YES - Press  and then  if you
want to include fixed-disk write tests, or
 and then  if you do not.
Go to the next step.

NO - Record the error message and have the
expansion unit serviced.

4

Did the following appear on your screen?

Note: If you pressed **N** (no write test),
PERFORMING WRITE TEST will not
appear.

DO YOU WANT TO INCLUDE FIXED DISK
WRITE TESTS ON DRIVE D: (Y/N) ? y
PERFORMING SEEK TEST
PERFORMING WRITE TEST
PERFORMING TRACK ZERO TEST
PERFORMING SURFACE SCAN
PLEASE STAND BY

YES - Your system has successfully completed
this test. Continue with the next Test.

NO - Record the error message and have the
expansion unit serviced.

Test 2000

Do you have an IBM Binary Synchronous Communications Adapter installed in your system?

NO - Continue with the next Test.

YES - Did any of the following error messages appear on your screen?

XX:XX:XX
ERROR - SYSTEM UNIT 20XX

XX:XX:XX
ERROR - SYSTEM UNIT 21XX

XX:XX:XX
ERROR EXPANSION UNIT 20XX

XX:XX:XX
ERROR EXPANSION UNIT 21XX

YES - Have the unit that contains the adapter serviced.

NO - Your system has completed this test successfully. Continue with the next Test.

Notes:

Test 2200

1 Do you have an IBM Personal Computer Cluster Adapter installed in your system?

NO - Continue with the next Test.

YES - Did either of the following error messages appear on your screen?

XX:XX:XX
ERROR-SYSTEM UNIT 22XX X

XX:XX:XX
ERROR-EXPANSION UNIT 22XX X

YES - Have the unit that contains the adapter and the terminating plug serviced.

NO - Go to the next step.

- 2** Did either of the following error messages appear on your screen?

TESTING – CLUSTER ADAPTER X
THE STATION ADDRESS IS XX
REMOTE IPL IS NOT SELECTED
XX:XX:XX
ERROR – SYSTEM UNIT 22XX
ERROR – EXPANSION UNIT 22XX
PRESS ENTER TO CONTINUE
?

YES - Have the unit that contains the adapter and the terminating plug serviced.

NO - Go to the next step.

3 The following will appear on your screen.

Note: When more than one Cluster Adapter is installed in a Personal Computer, each of the adapters will be tested.

**TESTING – CLUSTER ADAPTER X
THE STATION ADDRESS IS XX
REMOTE IPL IS NOT SELECTED**

**DO YOU WANT TO DISPLAY THE
CLUSTER STATUS (Y/N)?**

Go to the next step.

4

Does the adapter number, station address, and remote IPL information shown on your screen match the switch setting information you entered below?

Cluster Adapter Number _____

Station Address _____

Remote IPL (Is/Is Not) Selected _____

YES - Go to the next step.

NO - If the adapter number, station address, or remote IPL information is not correct, have the unit that contains the adapter serviced.

5 Do you want to display the cluster status?

Note: The cluster-status screen presentation will show 64 boxes that represent the stations in the cluster that have their Power switch set to On and are connected to the cluster bus.

**TESTING – CLUSTER ADAPTER X
THE STATION ADDRESS IS XX
REMOTE IPL IS NOT SELECTED**

**DO YOU WANT TO DISPLAY THE
CLUSTER STATUS (Y/N)?**

YES - Set the Power switch on all cluster system units (and expansion units, if installed) to On,

press then , then go to the next step.

NO - Your system has successfully completed this test. Remove the terminating plug and attach the coaxial cable to the Cluster Adapter connector.

Press , then , and continue with the next Test.

6

The following will appear on your screen.

TESTING - CLUSTER ADAPTER X
THE STATION ADDRESS IS X
REMOTE IPL IS NOT SELECTED

DO YOU WANT TO DISPLAY THE
CLUSTER STATUS (Y/N) ? y

CONNECT THE CABLE TO THE
CLUSTER ADAPTER

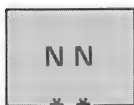
PRESS ENTER WHEN READY
?

Disconnect the terminating plug and attach the
coaxial cable to the Cluster Adapter's connector.

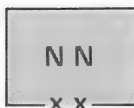
Press  and go to the next page.

This page explains the cluster status that may appear on your screen.

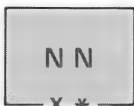
NN is any station address from 0 to 63.



The system you are using is indicated on the screen in blinking reverse video, and the box is marked by two asterisks.



Stations that have their Power switch set to On are displayed in reverse video, and their boxes are marked by two Xs.



If another Personal Computer has the same station address as your Personal Computer, a long beep will sound every 3 seconds, the box will be displayed in blinking reverse video and will be marked by an X and an asterisk.



A station address not in the cluster is indicated by a box displayed in normal video and not marked with Xs or asterisks.

A Cluster-Access Error message may be displayed in reverse video.

Go to next step.

7

Wait 15 seconds. Do all stations in the cluster appear and remain on the screen presentation?

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63						

CLUSTER STATUS FOR ADAPTER X
PRESS ANY KEY TO EXIT

Notes:

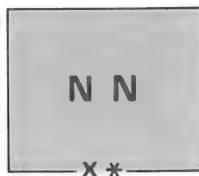
1. Your installation manager has a cluster map that lists the station addresses and the order in which the stations are connected. Compare the map and the status screen presentation to determine that all stations in the cluster are operating properly.
2. The status screen shows all stations installed on your cluster, and is updated every 3 seconds to show stations that are added to or removed from the cluster.

YES - Your system has successfully completed this test. Press any key and continue with the next Test.

NO - Go to the next step.

8

Did a box appear in blinking reverse video with an X and asterisk, and did a beep sound every 3 seconds?



YES - Another Personal Computer has the same station address as your Personal Computer. Compare your cluster map with the status screen presentation. Do the system diagnostic tests on the Personal Computer missing from the cluster-status screen presentation.

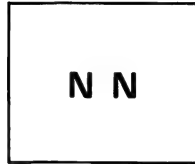
Have the unit that contains the failing adapter serviced.

NO - Go to the next step.

9

Did a box appear in normal video with no Xs or asterisks, for a station address that is in the cluster?

Note: Multiple grounds on cluster cables may cause stations to appear on the status screen presentation intermittently. If this happens, notify your installation manager.



YES - Go to Step 11.

NO - Go to the next step.

10 Do you have a cluster-access error?

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63						

CLUSTER ACCESS ERROR
PRESS ENTER TO CONTINUE

YES - Go to Step 11.

NO - Your system has successfully completed this test. Continue with the next Test.

11 You have stations that are not indicated on any status screen presentation, or by a cluster-access error message.

1. Do the system diagnostic tests on a station that is not indicated on any status screen presentation, or that has a cluster-access error.
2. If the diagnostic test fails, have the unit that contains the adapter serviced.
3. If the diagnostic test passes, continue doing the diagnostic tests until you test all of the stations that did not appear on any status screen presentation or that had a cluster-access error.
4. If the Cluster Adapters check good and the stations did not appear on the cluster-status screen presentations, notify your installation manager that you suspect the coaxial cable or a terminating plug.

Note: If you have more than one Cluster Adapter installed in your system, go back to page 2200-1 and continue until all Cluster Adapters are tested.

Test 7000

Do you have an IBM Printer attached to your system?

YES - Continue with the next Test.

NO - You have completed the Problem Determination Procedures with no failures. Remove the scratch diskette from your drive. Return the Diagnostics diskette to the back of this manual. Your system unit is ready to load your operating system.

If you should have any other problems, contact your place of purchase for additional help.

Notes:



Test 7010

1 Do you have an IBM Graphics/Matrix Printer attached to your system?

NO - Continue with the next Test.

YES - One of the following printer test patterns should print.

Matrix Printer Example

```
!"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz
{!}~
!"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz
{!}~
!"#$%&'()*+,-./
" 7 1 2 3 4 5 6 7 8 9
```

U.S. Graphics Printer Example

```

! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
ä î ó ù ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ
Σ π ρ ρ σ Σ β ρ σ π ρ σ @ Ω
□ □ □ □

```

International Graphics Printer Example

```

! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
ä î ó ù ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ ñ
Σ π ρ ρ σ Σ β ρ σ π ρ σ @ Ω
□ □ □ □
♥♦♣♠ ü é ä å à â

```

2

Did the printer test finish without any errors and the printer test pattern print correctly?

NO - Record the error message, and go to Test 8000.

YES - Continue with the next Test.

Notes:



Test 7020

1 Do you have an IBM PC Compact Printer attached to your system?

NO - Continue with the next Test.

YES - The following printer test pattern should print.

Compact Printer Example

```
! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
! " # $ % & ' ( ) * + , - . /
& i o u r n s z o z l r - 7 4 i < >
@ B C D E F G H I J K L M N O
[ ]
```

2 Did the printer test finish without any errors and the printer test pattern print correctly?

NO - Go to Test 8010.

YES - Continue with the next Test.

Notes:

Test 7030

1 Do you have an IBM Personal Computer Color Printer attached to your system?

NO - Continue with the next Test.

YES - Does your screen match the screen shown below?

SELECT PAPER WIDTH

1 - 8 1/2 INCH PAPER WIDTH

2 - 14 1/2 INCH PAPER WIDTH

ENTER THE OPTION DESIRED

?

NO - Go to Test 8020.

YES - Go to the next step.

2

Select the width of paper you are using.

SELECT PAPER WIDTH

1 - 8 1/2 INCH PAPER WIDTH



2 - 14 1/2 INCH PAPER WIDTH

ENTER THE OPTION DESIRED

?

Press  then  for paper

8-1/2 inches wide.

Press  then  for paper

14-1/2 inches wide.

3 The following printer test pattern should print.

Color Printer Example

!"#\$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz
pqrstuvwxyz{|}~
!"#\$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
üéàáâãäåæçèéêëìíîï
ä1áúññëëö—öñ;ö
≡:≥≤∫J÷z◦-√ηζ
αβγπξμτζεηθ
12345678901234567890
▶◀\$!!'H\$=±↑↓→←L↔▲▼
□ □ □ □
1 0
!!
wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
!!
wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
IIIIII IIIII IIIII IIIII IIIII IIIII
IIIIII IIIII IIIII IIIII IIIII IIIII
IIIIII IIIII IIIII IIIII IIIII IIIII
IIIIII IIIII IIIII IIIII IIIII IIIII
IIIIII IIIII IIIII IIIII IIIII IIIII

Note: If the print example shows the incorrect character set, check the DIP switches. If the DIP switches are set correctly, have your printer serviced.

4 Did the printer test pattern finish without any errors and the printer test pattern print correctly?



YES - Go to the next step.



NO - If the test pattern is correct but the colors are wrong, go to the next step. If the test pattern is not correct or you received an error message, record the error message and go to Test 8020.

5


Are the characters in your test pattern correct
and is each character only one color?

ARE THE CHARACTERS ON THE PRINTED
TEST PATTERN CORRECT, AND EACH
CHARACTER A SINGLE COLOR (Y/N)
?

YES - Press  then  and
go to Step 8.

NO - Press  then  and
continue on the next step.

Note: Refer to the "Ribbon-Color Knob Adjustment" procedure in the "IBM Personal Computer Color Printer Installation and Operating Instructions" in your *Guide to Operations*.

- 6** Perform the ribbon adjustment procedure. Then
press  to print the test pattern and
verify the adjustment.

Warning: Wait until the printer stops before making any adjustments.

- 7** Return to Step 4.

Note: If you are unable to adjust the ribbon, have the printer serviced.

- 8** Continue with the next Test.

Test 7900

You have completed the problem determination procedures. Remove the scratch diskette from your drive. Return the Diagnostics diskette to the back of this manual. Your system unit is now ready for you to load your operating system.

If you encounter any other problems, contact your place of purchase for additional help.

Notes:

Test 8000

1 Check your wall outlet for proper operation (use a working lamp).

2 Verify that the Printer Cable is properly connected to the printer and the system unit.

Did you find any problem while doing the above step?

NO - Go to the next step.

YES - Correct the problem and perform the system diagnostic tests again.

3 Set the Power switches on the printer and system unit to Off. (If an expansion unit is attached, also set its Power switch to Off.)

4 Disconnect the Printer Cable.

5

Perform the printer self-test:

1. Press and hold the Line Feed button while you set the printer's Power switch to On.
2. When the test starts, release the Line Feed button.

Note: The printer self-test takes approximately 10 minutes.

3. To stop the test before it finishes, set the printer's Power switch to Off.

Below are samples of the printouts for each of the IBM Graphics/Matrix Printers. Compare your printout with the appropriate sample.

Q RSTUVWXYZ[\]^_`'abcde
PQRSTUVWXYZ[\]^_`'abcdefghi
PQRSTUVWXYZ[\]^_`'abcdefghi
QRSTUVWXYZ[\]^_`'abcdefghijklmnop
RSTUVWXYZ[\]^_`'abcdefghijklmnopqrstu
STUVWXYZ[\]^_`'abcdefghijklmnopqrstuvwxy
TUVWXYZ[\]^_`'abcdefghijklmnopqrstuvwxy
UVWXYZ[\]^_`'abcdefghijklmnopqrstuvwxy
VWXYZ[\]^_`'abcdefghijklmnopqrstuvwxy
WXYZ[\]^_`'abcdefghijklmnopqrstuvwxy
YZ[\]^_`'abcdefghijklmnopqrstuvwxy
Z[\]^_`'abcdefghijklmnopqrstuvwxy
[\]^_`'abcdefghijklmnopqrstuvwxy
^_`'abcdefghijklmnopqrstuvwxy
_`'abcdefghijklmnopqrstuvwxy
`'abcdefghijklmnopqrstuvwxy
'abcdefghijklmnopqrstuvwxy
abcdefghijklmnopqrstuvwxy
bcdefghijklmnopqrstuvwxy
cdefghijklmnopqrstuvwxy
defghijklmnopqrstuvwxy
efghijklmnopqrstuvwxy
fghijklmnopqrstuvwxy
ghijklmnopqrstuvwxy
hijklmnopqrstuvwxy
ijklmnopqrstuvwxy
jklmnopqrstuvwxy
klmnopqrstuvwxy
lmnopqrstuvwxy
mnopqrstuvwxy
nopqrstuvwxy
opqrstuvwxy
pqrstuvwxy
qrstuvwxy
rstuvwxy
stuvwxy
tuvwxy
uvwxy
vwxy
wxy
xy
y
z

```
STUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ai  
RSTUVWXYZ[\]^_`abcdefg  
STUVWXYZ[\]^_`abcdefghijkln  
TUVWXYZ[\]^_`abcdefghijklmnpqr  
UVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy  
VWXYZ[\]^_`abcdefghijklmnopqrstvwxyz{|}~ai  
WXYZ[\]^_`abcdefghijklmnopqrstvwxyz{|}~ai  
XYZ[\]^_`abcdefghijklmnopqrstvwxyz{|}~ai  
ijklmnopqrstuvwxyz{|}~ai  
rstuvwxyz{|}~ai  
vwxyz{|}~ai  
~ai
```

```
?@AB
?@ABC
#%&'()*+,-./0123456789:;<=>?@ABCD
!"#$%&'()*+,-./0123456789:;<=>?@ABCDE
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
```

YES - Go to Step 13.

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- 7** Ensure the ribbon is installed properly.
- 8** Ensure the forms or paper is inserted properly.
- 9** Ensure the forms or paper path has no obstructions.

- 10** Ensure the tractors are adjusted properly.

If you need help with any of the above, refer to the operating instructions that came with your printer.

- 11** Did you find any problem while doing the above steps?

NO - Go to the next step.

YES - Correct the problem and restart the printer self-test.

Note: If you are using a non-U.S. English keyboard and your printout does not match the desired character set, have your printer serviced.

12 Does your printer have any of the following problems?

- It beeps even though the paper is inserted properly.
- It does not beep even when out of paper.
- Some lights on the control panel do not work.
- Some buttons on the control panel do not work.
- The printer continues to print when out of paper.
- The printer fails to print or prints incorrectly.

NO - Go to Step 14.

YES - Have your printer serviced.

13 Did you receive any of the following error messages during diagnostic testing?

199

432

901

1401

YES - Go to the next step.

NO - If you are still having a problem, go to step 16.

14 Leave the Printer Cable disconnected from the printer and do the system diagnostic tests again. Verify that the list of installed devices and options is correct (your printer will be missing from the list).

15 Did you receive the same error message during the system diagnostic tests?

YES - If your printer is attached to an adapter in your system unit, have the system unit serviced. If your printer is attached to an adapter in the expansion unit, have the expansion unit serviced.

NO - Have the printer and cable serviced.

16 Your printer also is controlled by program commands from the system unit. If you still have a printer problem, or if the problem occurs only during a particular program, examine the program thoroughly for commands that might cause the printer to produce undesired results.

If you complete the printer self-test and have no apparent program problems, have the unit to which the printer is attached serviced.

Test 8010

1 Check your wall outlet for proper operation (use a working lamp).

2 Verify that the Printer Cable is properly connected to the printer and system unit.

Did you find any problem while doing the above step?

NO - Go to the next step.

YES - Correct the problem and perform the system diagnostic tests again.

3 Set the Power switches on the printer and system unit to Off. (If an expansion unit is attached, also set its Power switch to Off.)

4 Disconnect the Printer Cable.

5

Perform the printer self-test:

1. Be sure that nothing prevents the paper from moving.
2. Be sure the top cover is closed properly.
3. Press and hold down the Form Feed button while you set the printer's Power switch to On.
4. When the test starts, release the Form Feed button.

6

This test will run until you set the printer's Power switch is set to Off.

Below is a sample of the printout for the IBM PC Compact Printer. Compare your printout with the sample.

Did the self-test finish without failures?

YES - Go to Step 9.

NO - Go to the next step.

8 Does your printer have any of the following problems?

- Its Ready light blinks continuously.
- It prints reversed question marks continuously.
- It prints characters with extra or missing dots.
- It sounds as if it is operating but does not print. (Be sure the paper is inserted properly.)
- It does not do anything.

YES - Have your IBM PC Compact Printer serviced.

NO - Go to the next step.

9 Your printer also is controlled by program commands from the system unit. If you still have a printer problem, or a problem occurs only during a particular program, examine the program thoroughly for commands that might cause the printer to produce undesired results.

10 If you have completed the printer self-test and have no apparent program problems, have the unit to which the printer is attached serviced.

Test 8020

1 Check your wall outlet for proper operation (use a working lamp).

2 Verify that the Printer Cable is properly connected to the printer and system unit.

Did you find any problem while doing the above step?

NO - Go to the next step.

YES - Correct the problem and perform the system diagnostic tests again.

3 Set the Power switches on the printer and system unit to Off. (If an expansion unit is attached, also set its Power switch to Off.)

4 Disconnect the Printer Cable.

5

Perform the printer self-test:

1. Open the access cover and set all DIP switches to Off.
2. Close the access cover.
3. Set the printer's Power switch to On.
4. Press the Ready button to set the printer to the Not Ready state (Ready light is off).
5. Press the Test Mode button.
6. To stop the test, press the Test Mode button again.

6

Below is a sample of the printout for the IBM Personal Computer Color Printer. Compare your printout with the sample.



Did the self-test finish without failures?

YES - Go to Step 15.

NO - Go to the next step.

- 7** Ensure the ribbon is installed properly.
- 8** Ensure your forms or paper is inserted properly.
- 9** Ensure the forms path or paper path has no obstructions.
- 10** Ensure the tractors are adjusted properly.

If you need help with any of the above, refer to the operating instructions that came with your printer.

Did you find any problem while doing the above steps?

NO - Go to the next step.

YES - Correct the problem and restart the printer self-test.

Note: If you are using a non-U.S. English keyboard and your printout does not match the desired character set, verify that the switch settings are correct for the desired character set. If the switch settings are correct, have your printer serviced.

11 Does your printer have any of the following problems?

- It beeps even though the paper is inserted properly.
- It does not beep even when out of paper.
- Some lights on the control panel do not work.
- Some buttons on the control panel do not work.
- The printer continues to print when out of paper.
- The printer fails to print or prints incorrectly.

NO - Go to Step 18.

YES - Go to the next step.

12 Ensure that all DIP switches are set to Off. (See the switch setting charts in your printer's installation and operating instructions.)

13 Ensure the Forms Thickness Control lever is properly adjusted.

14 Ensure the Feed Mode lever is in the correct position.

Did you find any problem while doing the above steps?

NO - Have your printer serviced.

YES - Correct the problem and restart the printer self-test.

15 If you receive any of the following error messages during diagnostic testing, continue with the next step:

199

432

901

1401

2901

2902

If you did not receive any of the error messages but still have a problem, go to Step 18.

16 Leave the Printer Cable disconnected from the printer and do the system diagnostic tests again. Verify that the list of installed devices and options is correct (your printer will be missing from the list).

17 Did you receive the same error message during the tests?

YES - If your printer was attached to an adapter in your system unit, have the system unit serviced. If your printer was attached to an adapter in the expansion unit, have the expansion unit serviced. Remember to reset the DIP switches.

NO - Have the printer and its cable serviced.

18 Your printer also is controlled by program commands from the system unit. If you are still having a printer problem, or if a problem occurs only during a particular program, examine the program thoroughly for commands that might cause the printer to produce undesired results.

If you have completed the printer self-test and have no apparent program problems, have the unit to which the printer is attached serviced.

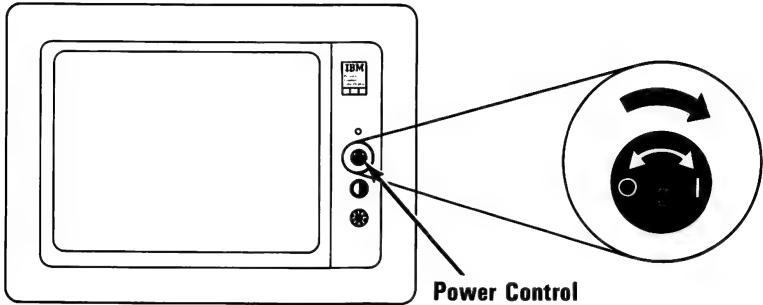
Remember to reset the DIP switches.

Notes:

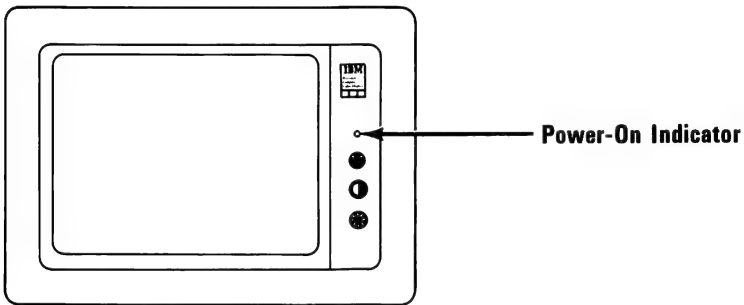
Test 9000

Note: If your IBM Color Display requires service, it must be returned with the power cord.

- 1** Set the Power control to On.



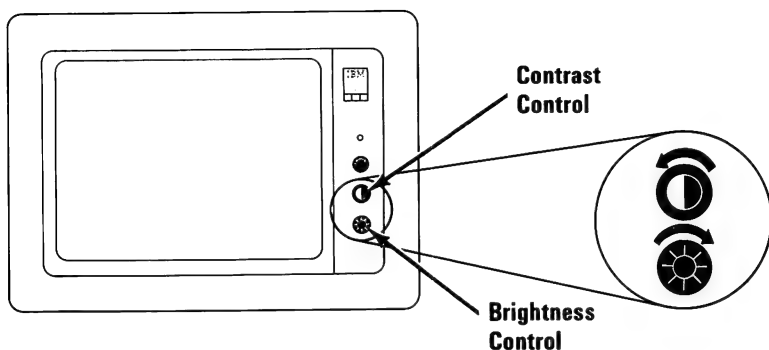
- 2** Is the Power-On indicator lit?



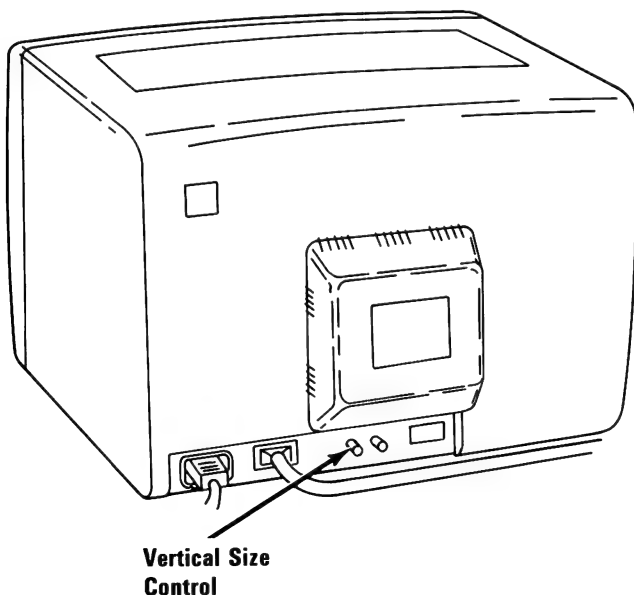
YES - Go to the next step.

NO - Check that the power cord is plugged into a functioning wall outlet and into the rear of the display. If it is, have the display serviced.

- 3** Set the Power switch on the system unit (and expansion unit, if attached) to Off.
- 4** Turn the Brightness and Contrast controls fully clockwise.

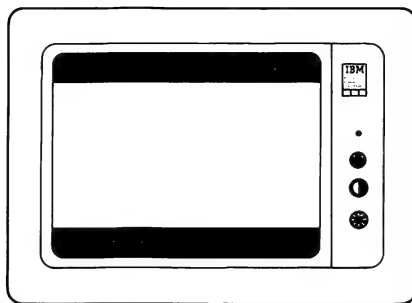


- 5** Turn the Vertical Size control fully counterclockwise. A black area should appear across the top and bottom of the screen.



6

Does the black area appear across the top and bottom of the screen?

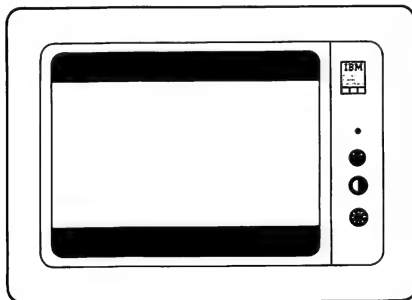


YES - Go to the next step.

NO - Have the display serviced.

7

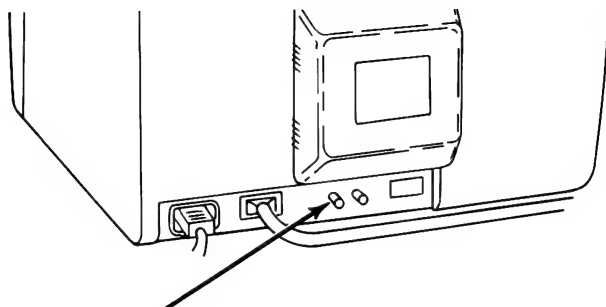
Are the black areas approximately the same size?



YES - Go to the next step.

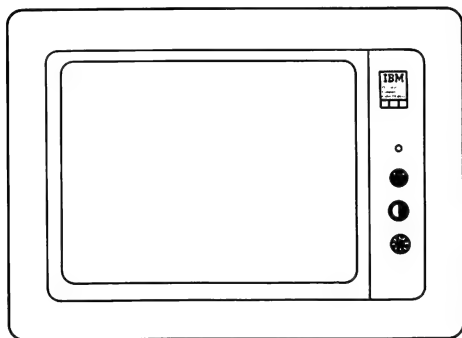
NO - Have the display serviced.

- 8** Turn the Vertical Size control clockwise until the black areas just disappear. If one of the black areas disappears before the other, continue to turn the control until the second black area is gone.



**Vertical Size
Control**

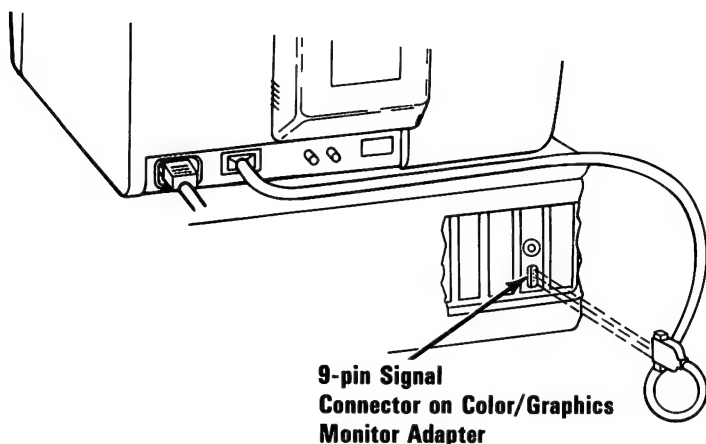
- 9** Is the entire screen white?



YES - Go to Step 14.

NO - Go to the next step.

- 10** Set the display's Power control to Off.
- 11** Disconnect the display's signal cable from the system unit (or expansion unit).



- 12** Set the display's Power control to On.
- 13** Is the screen white?
 - YES** - Have the unit to which the display was attached serviced.
 - NO** - Have the display serviced.
- 14** Watch the screen and set the Power switch on the expansion unit (if attached) to On. Then set the system unit's Power switch to On.

- 15** Did the screen change from white to black when the Power switch was set to On? (The screen may remain black for only 13 seconds before changing again.)

YES - Go to the next step.

NO - Have the display serviced.

- 16** Wait for the power-on self test (POST) to finish. The IBM Personal Computer BASIC message, with a blinking cursor, appears unless a diskette is inserted or an operating system is automatically loaded from a fixed disk drive.

The IBM Personal Computer Basic
Version CX.XX Copyright IBM Corp. XXXX
XXXXX Bytes free
Ok

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6LPT1 7TRON 8TROFF 9KEY 0SCREEN

17 Is your screen blank?

NO - Go to the next step.

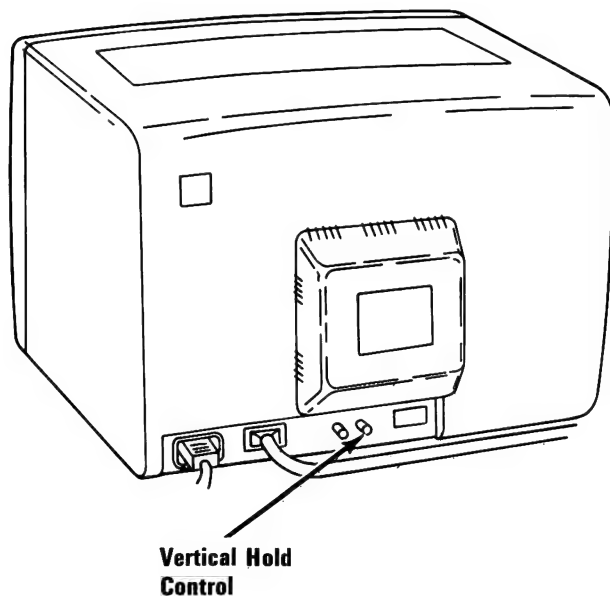
YES - Have the unit to which the display was attached serviced.

18 Is the screen presentation steady?

YES - Go to Step 21.

NO - Go to the next step.

19 Turn the Vertical Hold control clockwise as far as it will go, then turn it counterclockwise until the presentation is steady.



20 Were you able to make the presentation steady?

YES - Go to the next step.

NO - Have the display serviced.

21 Does the screen have white characters on a dark background?

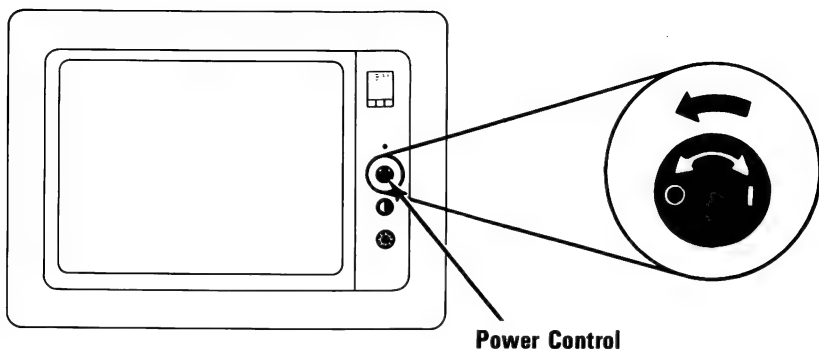
YES - Go to Step 27.

NO - Go to the next step.



22 Set the Power switch on the system unit (and expansion unit, if attached) to Off.

23 Set the display's Power control to Off.



24 Disconnect the display's signal cable from the system unit (or expansion unit).

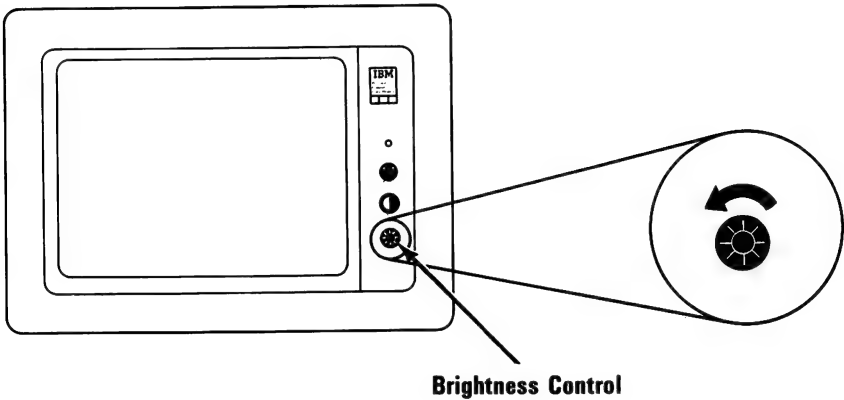
25 Set the display's Power control to On.

26 Is the screen white?

YES - Have the unit to which the display was attached serviced.

NO - Have the display serviced.

27 Turn the Brightness control fully counterclockwise.

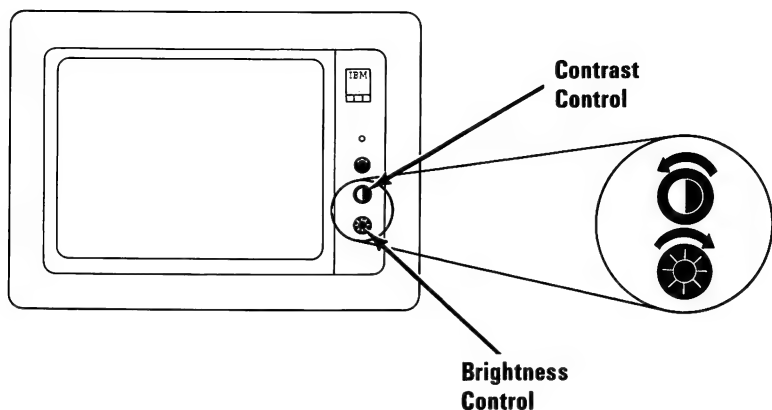


28 Does the intensity of the characters decrease?

YES - Go to the next step.

NO - Have the display serviced.

- 29** Turn the **Brightness** control fully clockwise and the **Contrast** control fully counterclockwise.

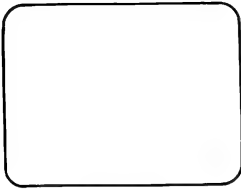


- 30** Does the intensity of the characters decrease?

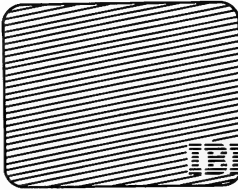
YES - Go to the next step.

NO - Have the display serviced.

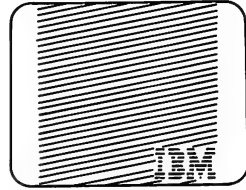
31 Turn the Contrast control fully clockwise. Can you find your problem in the following examples?



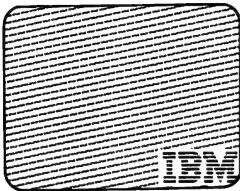
Too Dim



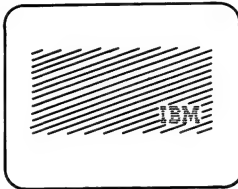
Too Wide



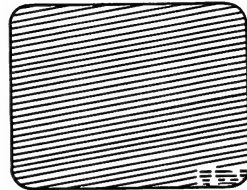
Too Narrow



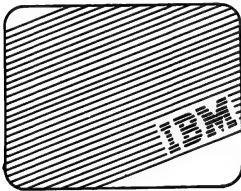
Out of Focus



Shrunken



**Characters shifted left
or right or up and
down off the display
area**



Tilted

YES - Have your display serviced.

NO - Go to “Diagnostic Testing” on page
Test 000-1 earlier in this section.

SECTION 5. OPTIONS

Contents

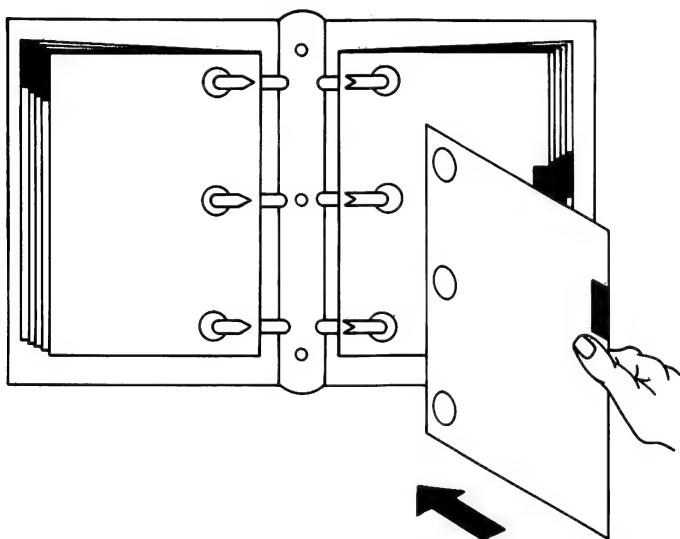
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How to Use This Section

This section provides a place for you to file the instructions for installing the options you purchased for your IBM Personal Computer. Be sure to read "Handling Static-Sensitive Devices" before installing an option in your IBM Personal Computer. Because many of the options refer to switch settings, a complete list of the settings is in this section.

After you install an option, file the installation instructions under the appropriate tab as shown in the figure below.



Switch Settings

Displays

Printers

Diskette/Disk

Memory

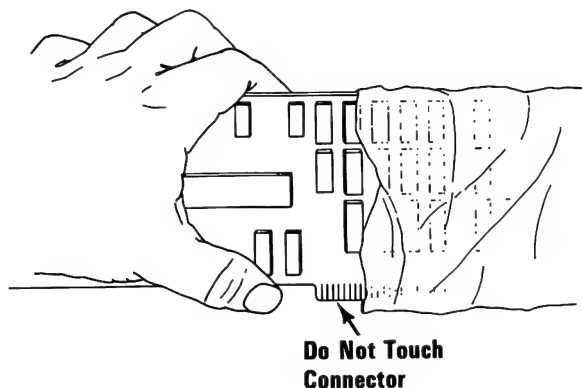
General

Communications

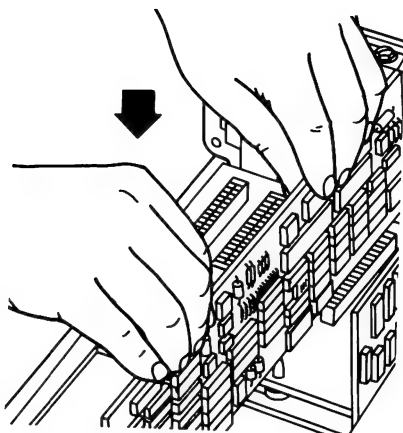
Handling Static-Sensitive Devices

Some components of the options for your IBM Personal Computer can be damaged by static discharges. To prevent such damage, your option may be wrapped in a conductive, anti-static bag; certain precautions should be taken before removing the option from its bag.

Hold the option (still wrapped in its anti-static bag) in one hand. Touch an *unpainted* metal part (for example, the screws on the rear of the system unit) with the other hand. This will place your body, the option, and the system unit at the same ground potential, preventing an accidental static discharge.



Carefully remove the option from its anti-static bag. Be sure to handle circuit boards by the edges only and do not touch the component pins or solder joints. Grasp diskette drives and fixed disk drives by their frames to avoid touching the circuit board. Memory chips should be held by their narrow ends only, not by their pins.



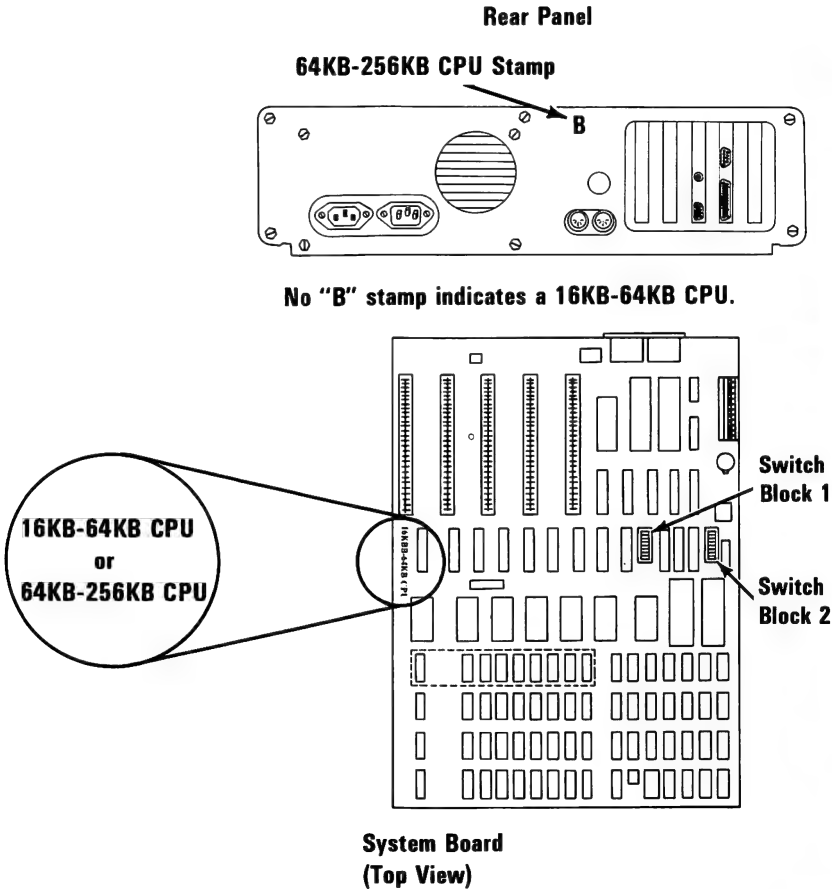
When inserting an option adapter into the system board, grasp it by its top edge or upper corners.

Notes:

Switch Setting Charts

Use the illustrations below to determine which system board is in your system unit.

- A 16KB-64KB system board has no identification on the rear panel and 16KB-64KB CPU is printed on the system board. If you have this system board, go to page 5-8.
- A 64KB-256KB system board has a "B" stamped on the rear panel and 64KB-256KB CPU printed on the system board. If you have this system board, go to page 5-33.



16K-64K System Board Switches

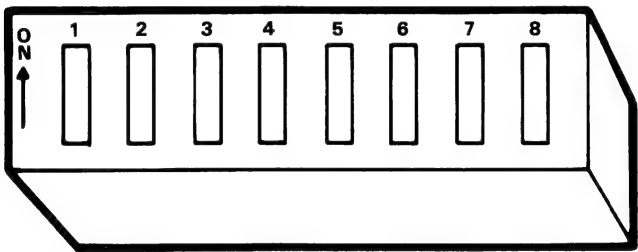
To use the following switch setting charts, your system should have no "B" stamped on the rear panel, and the system board should have 16KB-64KB CPU printed on the side.

The switches on the system board are set as shown in the figure below and on the following pages. These settings are necessary for the system to address the attached devices and to specify the amount of memory on the system board.

Two types of DIP switches are installed on the system boards and option adapters. Set a rocker switch by pressing down the rocker to the desired position. Push a slider switch to the desired position.

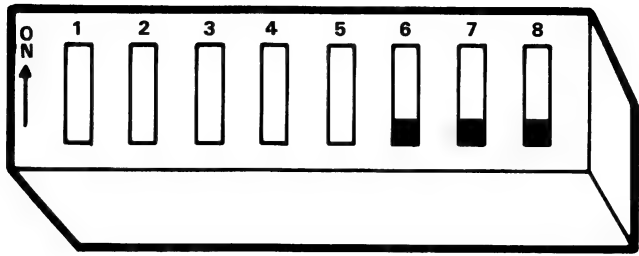
Warning: Before you change any switch settings, make a note of how the switches are presently set.

Switch Block 1



Switch	Function
1,7,8	Number of 5-1/4 inch diskette drives installed
2	Coprocessor
3,4	System board memory switches
5,6	Types of displays attached

Switch Block 2



Switch	Function
1,2,3,4,5	Amount of memory options installed
6,7,8	Always in the Off position

Notes:

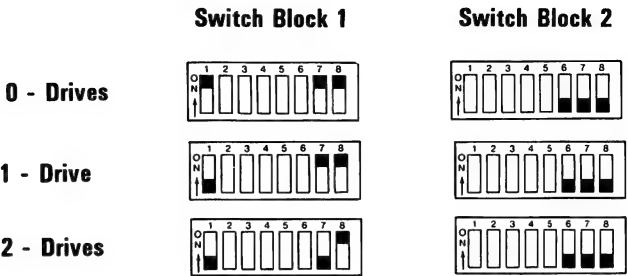
1. The system board must be fully populated, 64KB of memory, before a memory expansion option can be installed.
2. To expand the memory of your system beyond 544K requires your IBM Personal Computer System Unit to have a BIOS ROM module dated 10/27/82 or later. To determine the date of your ROM module, run the following BASIC program. Type the program exactly as shown.

```
10 DEF SEG=&HF000
20 FOR X=&HFFF5 TO &HFFFF
30 PRINT CHR$(PEEK(X));
40 NEXT
RUN
```

3. The date that is displayed is the date of your ROM module. Contact your authorized IBM Personal Computer dealer for a ROM module if it is needed.

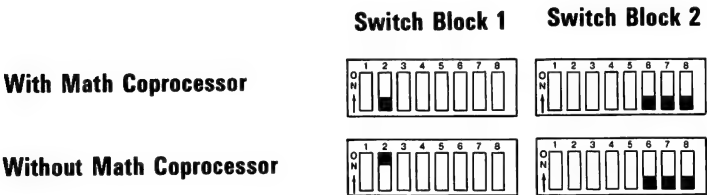
5-1/4 Inch Diskette Drives

The following figures show how switches 1, 7 and 8 must be set for the number of diskette drives installed.



Coprocessor

Switch 2 is set to indicate if the coprocessor is installed.



Types of Displays

The following figures show how switches 5 and 6 must be set for the type of display attached.

Warning: If an IBM Monochrome Display is connected to your system, switches 5 and 6 on switch block 1 **must** be Off. Damage to your display can result from incorrect switch settings.

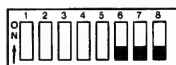
Warning: Damage to your IBM Monochrome Display may result if it is connected to an IBM Color/Graphics Monitor Adapter.

**IBM Color Graphics
Monitor Adapter in the
40x25 Color mode**

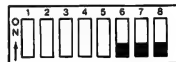
Switch Block 1



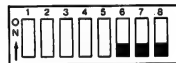
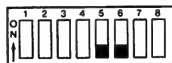
Switch Block 2



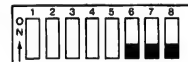
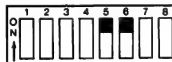
**IBM Color Graphics
Monitor Adapter in the
80x25 Color mode**



**IBM Monochrome Adapter
or both IBM Monochrome
Adapter and IBM Color
Graphics Monitor Adapter**



No Display

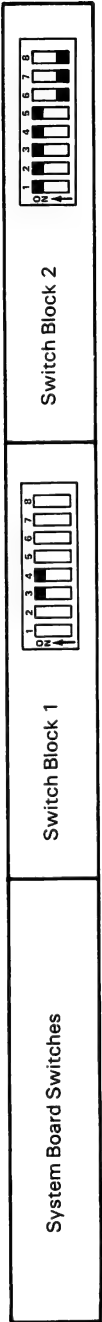


Note: The 40x25 Color mode means that there are 40 characters across the screen and 25 lines down the screen. This mode is normally used with a television set. The 80x25 Color mode means there are 80 characters across the screen and 25 lines down the screen. This mode, when used with a TV or some other display, can cause loss of character quality.

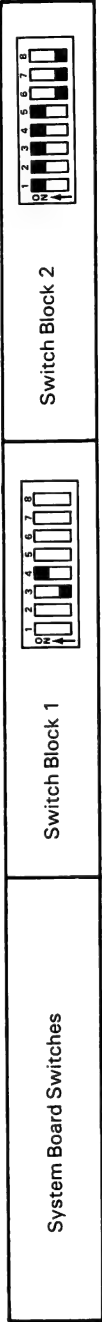
Memory Option Switches

(16KB-64KB CPU) System Board

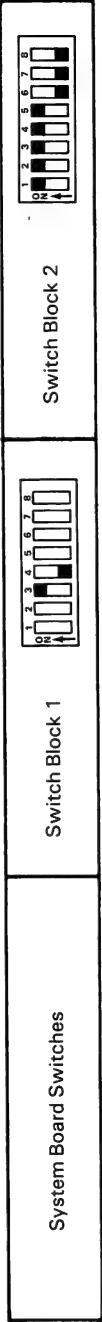
16K Total Memory



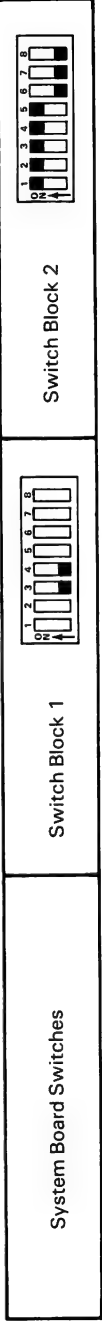
32K Total Memory



48K Total Memory







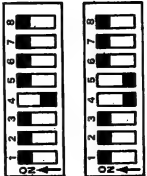
64K Total Memory





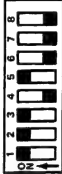





**96K Total Memory
32K + 64K on System Board**

System Board Switches	<div> </div> <div>Switch Block 1</div>	<div> </div> <div>Switch Block 2</div>
1 - 32K option	64/256K Option Card Switches	64K Option Card Switches
		32K Option Card Switches





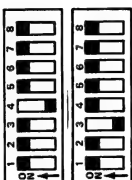

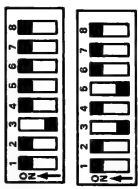
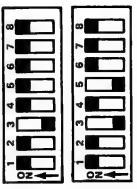

**128K Total Memory
64K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 64K installed		
1 - 64K option		
2 - 32K options		

**160K Total Memory
96K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 64K installed 1 - 32K option		
1 - 64K option 1 - 32K option		
3 - 32K options		  

**192K Total Memory
128K + 64K on System Board**







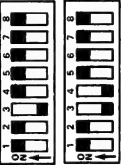
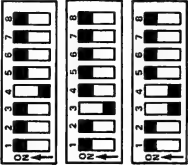

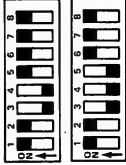
System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 64K option installed 1 - 64K option		
2 - 64K options		
1 - 64/256K option with 64K installed 2 - 32K options		
1 - 64K option 2 - 32K options		
1 - 64/256K option with 128K installed		

**224K Total Memory
160K + 64K on System Board**







System Board Switches	Switch Block 1	Switch Block 2

	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 64K installed 1 - 64K option 1 - 32K option			
2 - 64K options 1 - 32K option			
1 - 64/256K option with 128K installed 1 - 32K option			

**256K Total Memory
192K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 192K installed		
1 - 64/256K option with 128K installed 1 - 64K option		
1 - 64/256K option with 64K installed 2 - 64K options		
3 - 64K options		
1 - 64/256K option with 128K installed 2 - 32K options		

**288K Total Memory
224K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 32K option		
1 - 64/256K option with 128K installed 1 - 64K option 1 - 32K option		
	64/256K Option Card Switches	64K Option Card Switches
		
	32K Option Card Switches	




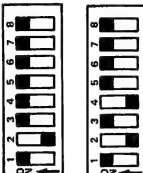
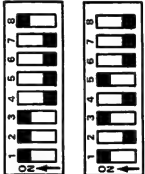


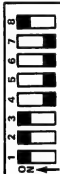
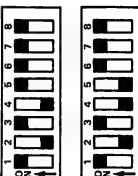
320K Total Memory 256K + 64K on System Board

System Board Switches	Switch Block 1	Switch Block 2
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 128K installed 2 - 64K options		
1 - 64/256K option with 192K installed 1 - 64K option		
1 - 64/256K option with 192K installed 2 - 32K options		
1 - 64/256K option with 256K installed		



**352K Total Memory
288K + 64K on System Board**







System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 64K option 1 - 32K option		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 256K installed 1 - 32K option		
	64/256K Option Card Switches	32K Option Card Switches

384K Total Memory 320K + 64K on System Board



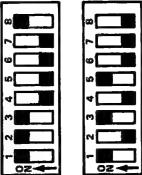


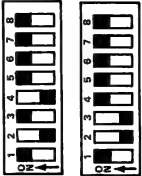

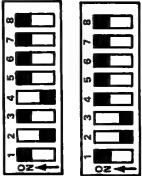
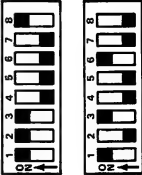
System Board Switches	Switch Block 1	Switch Block 2	
			
	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 192K installed 2 - 64K options			
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed			
1 - 64/256K option with 256K installed 1 - 64K option			
1 - 64/256K option with 256K installed 2 - 32K options			

**416K Total Memory
352K + 64K on System Board**

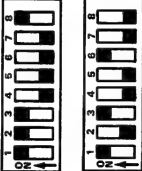

System Board Switches	Switch Block 1	Switch Block 2
		

	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 32K option	 		
1 - 64/256K options with 256K installed 1 - 64K option 1 - 32K option			



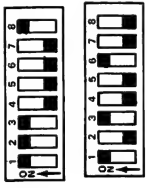

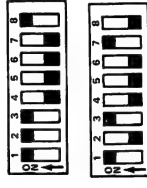
**448K Total Memory
384K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 64K option	 	 
1 - 64/256K option with 256K installed 2 - 64K options		
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed		



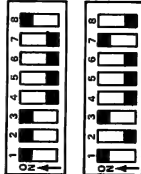

**480K Total Memory
416K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
<p>1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed 1 - 32K option</p>	<p>64/256K Option Card Switches</p> 	<p>64K Option Card Switches</p> <p>32K Option Card Switches</p> 



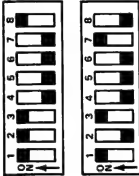

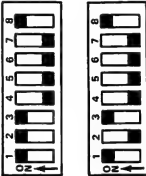
**512K Total Memory
448K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed 1 - 64K option	64/256K Option Card Switches 	64K Option Card Switches 
1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed		



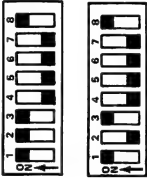

**544K Total Memory
480K + 64K on System Board**

System Board Switches		Switch Block 2	
1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed 1 - 32K option	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
			


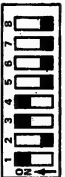
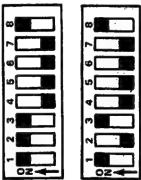

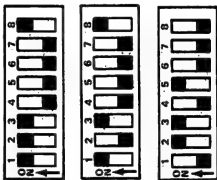
**576K Total Memory
512K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed 1 - 64K option	64/256K Option Card Switches 	64K Option Card Switches 
2 - 64/256K option with 256K installed		

**608K Total Memory
544K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
<p>2 - 64/256K option with 256K installed 1 - 32K option</p>		
	64/256K Option Card Switches	32K Option Card Switches
		

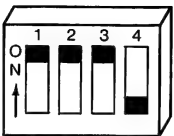
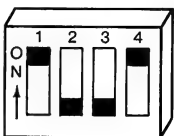
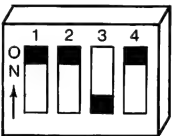
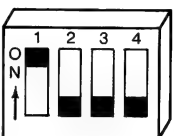
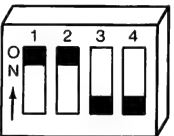
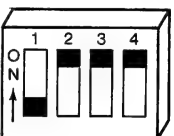
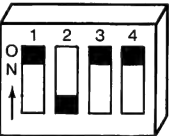
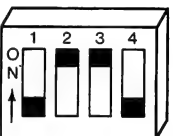
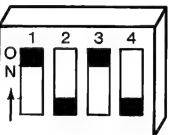
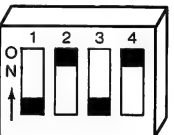
**640K Total Memory
576K + 64K on System Board**

System Board Switches	Switch Block 1	Switch Block 2	
			
	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
2 - 64/256K option with 256K installed 1 - 64K option			
2 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed			

Extender Card Switches

Set the switches on the Extender Card to reflect total system memory.

Extender Card Switch Settings

16K to 64K 	352K to 384K 
96K to 128K 	416K to 448K 
160K to 192K 	480K to 512K 
224K to 256K 	544K to 576K 
288K to 320K 	608K to 640K 

Notes:



64K-256K System Board Switches



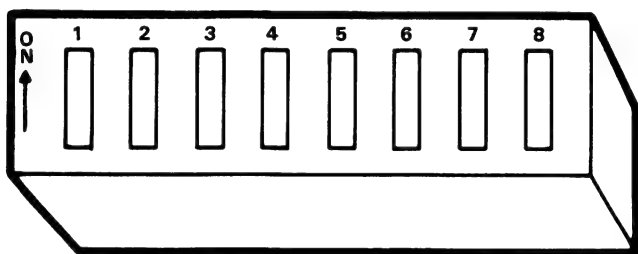
To use the following switch setting charts, your system should have a "B" stamped on the rear panel, and the system board should have 64KB-256KB CPU printed on the side.

The switches on the system board are set as shown in the figure below and on the following pages. These settings are necessary for the system to address the attached devices and to specify the amount of memory on the system board.

Two types of DIP switches are installed on the system boards and option adapters. Set a rocker switch by pressing down the rocker to the desired position. Push a slider switch to the desired position.

Warning: Before you change any switch settings, make a note of how the switches are presently set.

Switch Block 1



Switch	Function
1,7,8	Number of 5-1/4 inch diskette drives installed
2	Coprocessor
3,4	System board memory switches
5,6	Types of displays attached

Switch Block 2



Switch	Function
1,2,3,4,5	Amount of memory options installed
6,7,8	Always in the Off position

Note: The system board must be fully populated, 256KB of memory, before a memory expansion option can be installed.

Coprocessor

Switch 2 is set to indicate if the coprocessor is installed.

	Switch Block 1	Switch Block 2
With Math Coprocessor		
Without Math Coprocessor		

Types of Displays

The following figures show how switches 5 and 6 must be set for the type of display attached.

Warning: If an IBM Monochrome Display is connected to your system, switches 5 and 6 on switch block 1 **must** be Off. Damage to your display can result from incorrect switch settings.

Warning: Damage to your IBM Monochrome Display may result if it is connected to an IBM Color/Graphics Monitor Adapter.

**IBM Color Graphics
Monitor Adapter in the
40x25 Color mode**

Switch Block 1



Switch Block 2



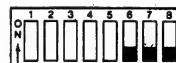
**IBM Color Graphics
Monitor Adapter in the
80x25 Color mode**



**IBM Monochrome Adapter
or both IBM Monochrome
Adapter and IBM Color
Graphics Monitor Adapter**



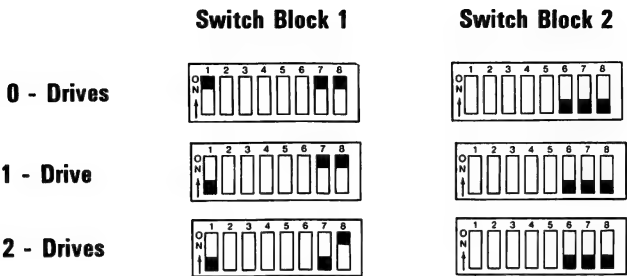
No Display



Note: The 40x25 Color mode means that there are 40 characters across the screen and 25 lines down the screen. This mode is normally used with a television. The 80x25 Color mode means there are 80 characters across the screen and 25 lines down the screen. This mode, when used with a TV or some other display, can cause loss of character quality.

5-1/4 Inch Diskette Drives

The following figures show how switches 1, 7 and 8 must be set for the number of diskette drives installed.



64KB-256KB System Board

64K Total Memory

System Board Switches	<div> <div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div> <div> <div>0</div><div>1</div> </div> </div> <div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div>	Switch Block 1	<div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div> <div> <div>0</div><div>1</div> </div>
-----------------------	--	----------------	---

1

2

3

4

5

6

7

8

128K Total Memory

System Board Switches	<div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div> <div> <div>0</div><div>1</div> </div>
-----------------------	---

1

2

3

4

5

6

7

8

192K Total Memory

System Board Switches	<div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div> <div> <div>0</div><div>1</div> </div>
-----------------------	---

1

2

3

4

5

6

7

8

256K Total Memory

System Board Switches	<div> <div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div> </div> <div> <div>0</div><div>1</div> </div>
-----------------------	---

1

2

3

4

5

6



7





8

288K Total Memory
32K + 256K on System Board










System Board Switches	Switch Block 1	Switch Block 2
1 - 32K option	64/256K Option Card Switches	32K Option Card Switches
	64K Option Card Switches	

320K Total Memory 64K + 256K on System Board

System Board Switches	Switch Block 1	Switch Block 2
		

	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 64K installed			
1 - 64K option			
2 - 32K options			 







352K Total Memory
96K + 256K on System Board

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 64K installed 1 - 32K option		
1 - 64K option 1 - 32K option		
3 - 32K options		  




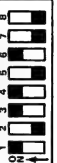


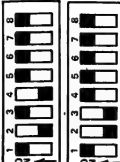
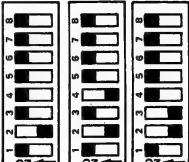

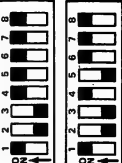
384K Total Memory 128K + 256K on System Board

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 64K installed 1 - 64K option		
2 - 64K options		
1 - 64/256K option with 64K installed 2 - 32K options		
1 - 64K option 2 - 32K options		
1 - 64/256K option with 128K installed		





**416K Total Memory
160K + 256K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 64K installed 1 - 64K option 1 - 32K option		
2 - 64K options 1 - 32K option		
1 - 64/256K option with 128K installed 1 - 32K option		




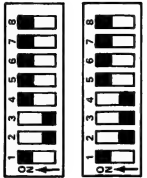



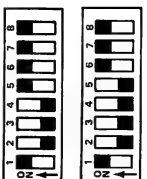

448K Total Memory 192K + 256K on System Board

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 192K installed		
1 - 64/256K option with 128K installed 1 - 64K option		
1 - 64/256K option with 64K installed 2 - 64K options		
3 - 64K options		
1 - 64/256K option with 128K installed 2 - 32K options		





**480K Total Memory
224K + 256K on System Board**






System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 32K option		
1 - 64/256K option with 128K installed 1 - 64K option 1 - 32K option		

**512K Total Memory
256K + 256K on System Board**

System Board Switches	Switch Block 1	Switch Block 2	
			
1 - 64/256K option with 128K installed 2 - 64K options			32K Option Card Switches
1 - 64/256K option with 192K installed 1 - 64K option			
1 - 64/256K option with 192K installed 2 - 32K options			
1 - 64/256K option with 256K installed			

544K Total Memory
288K + 256K on System Board

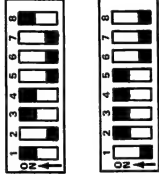

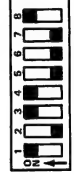

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 64K option 1 - 32K option		
1 - 64/256K option with 256K installed 1 - 32K option		

64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
		
		











576K Total Memory 320K + 256K on System Board

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 2 - 64K options		
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed		
1 - 64/256K option with 256K installed 1 - 64K option		
1 - 64/256K option with 256K installed 2 - 32K options		

**608K Total Memory
352K + 256K on System Board**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 32K option		
1 - 64/256K option with 256K installed 1 - 64K option 1 - 32K option		

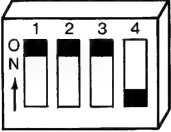
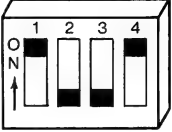
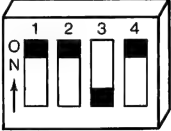
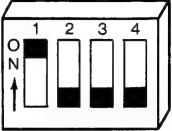
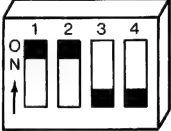
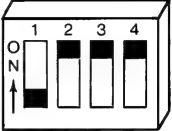
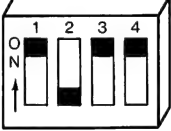
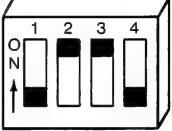
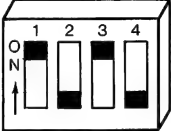
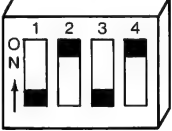
**640K Total Memory
384K + 256K on System Board**

System Board Switches	Switch Block 1	Switch Block 2	
			
	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 64K option	 		
1 - 64/256K option with 256K installed 2 - 64K options		 	
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed	 		

Extender Card Switches

Set the switches on the Extender Card to reflect total system memory.

Extender Card Switch Settings

16K to 64K 	352K to 384K 
96K to 128K 	416K to 448K 
160K to 192K 	480K to 512K 
224K to 256K 	544K to 576K 
288K to 320K 	608K to 640K 

SECTION 6. RELOCATE

Contents

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Notes:



Preparing the System

If you have an expansion unit with a fixed disk drive installed, use the following procedure to prevent damage to the fixed disk during relocation.

Warning: Normal shipping and handling can result in a permanent loss of all data on a fixed disk drive. We recommend that you back up all fixed-disk files onto diskettes before continuing with this procedure.

Depending on the amount of data stored, you may need as many as 64 formatted diskettes to back up each fixed disk drive. Refer to the *IBM DOS* manual for a description of the Backup command. Following is the procedure for preparing your system.

- 1 Insert the Diagnostics diskette into drive A.
- 2 Set the Power switch on the expansion unit (if attached) and system unit to On.

The following message appears on your screen.

```
The IBM Personal Computer DIAGNOSTICS
Version XXX (C) Copyright IBM Corp XXXX, XXXX

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
?
```

3 Press  then .

This step moves the disk head over track 305 which is the position designated for moving your system.

The following message should appear on your screen.

SELECT AN OPTION

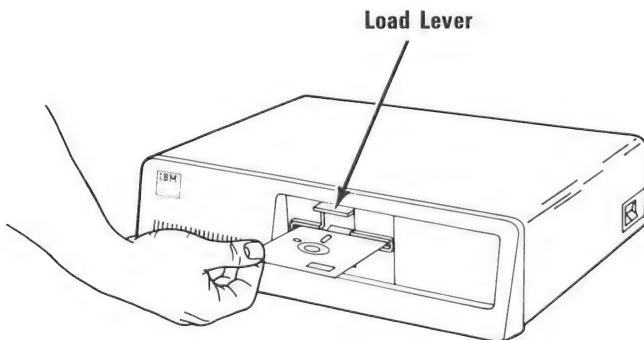
- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

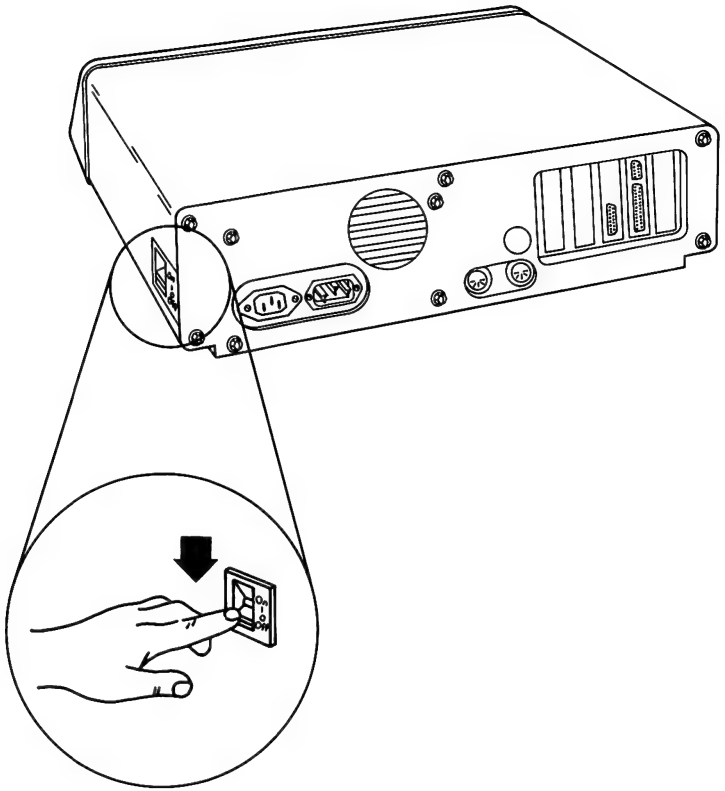
? 3

SYSTEM READY FOR RELOCATION

4 Remove the Diagnostics diskette from the diskette drive and return it to the back of your manual.

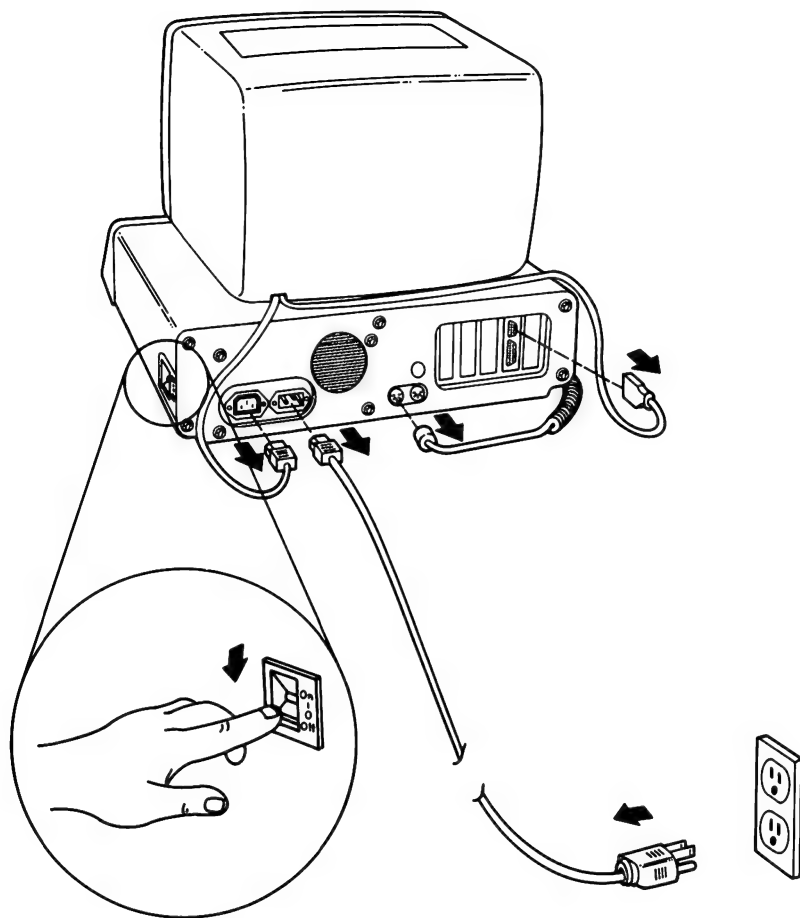


- 5** Set power switches to Off on all units (system unit, printer, etc.).

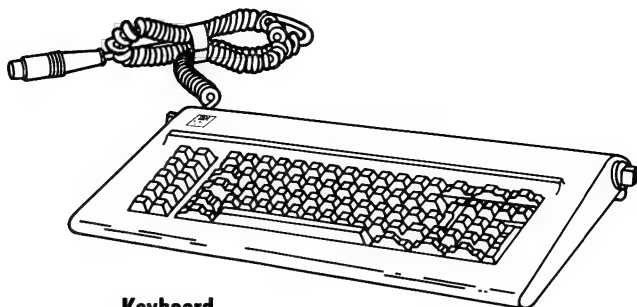


Note: Insert the shipping cardboards if you kept them as suggested in “Setup.”

- 6** Unplug the system unit's (and expansion unit's) power cord from the wall outlet. Disconnect all cables from the rear of the units.

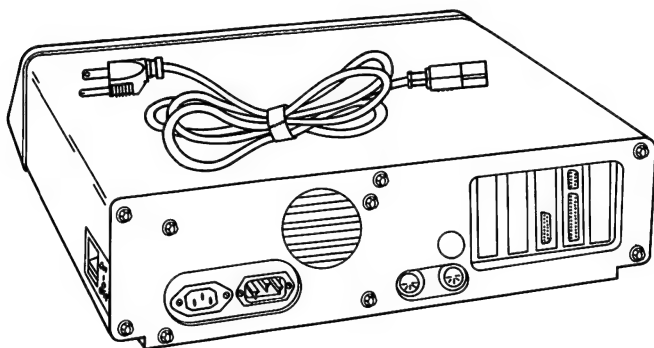


- 7** Coil the cables to protect the connectors.



Keyboard

- 8** Tape the coiled cables to the system unit (and expansion unit) so the units may be carried safely. (We recommend filament or masking tape.)

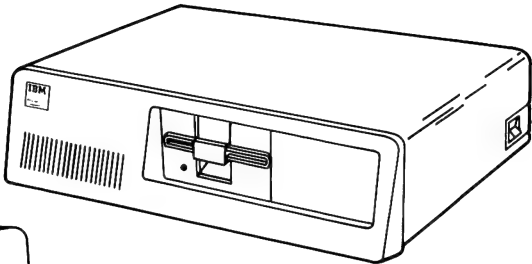


Short Distance Move

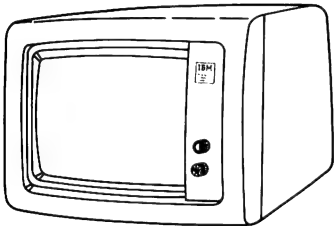
Short distance means any distance where trucking is not involved. For example, moving from one office or floor to another.

We recommend that each unit be moved separately.

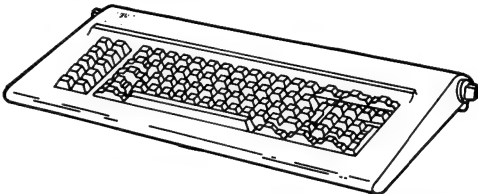
Note: A second person may be helpful (doors, stairs, etc.).



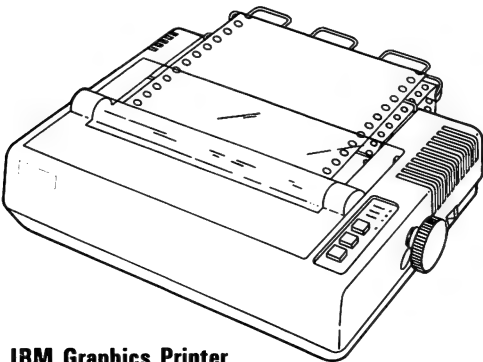
System Unit



IBM Monochrome Display



Keyboard



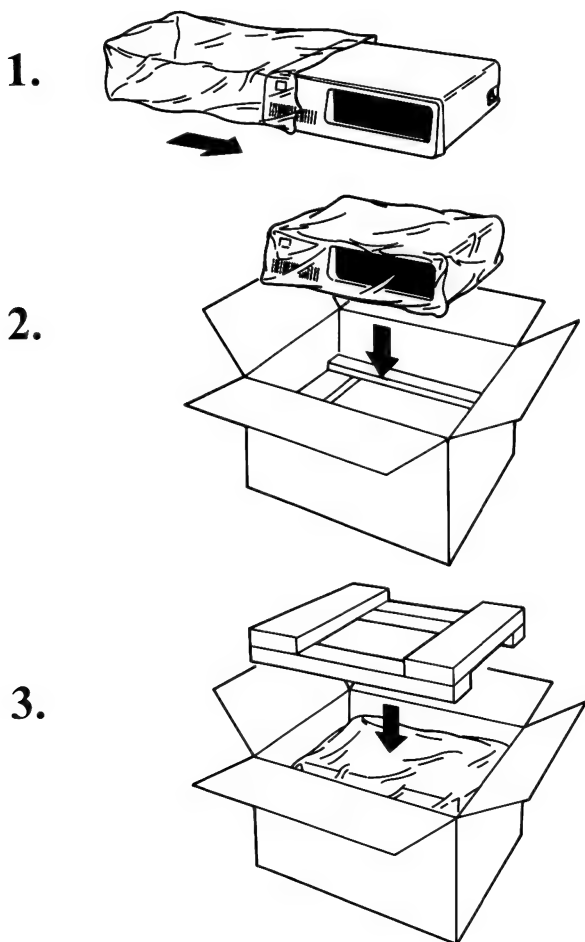
IBM Graphics Printer

Long Distance Move

All Units

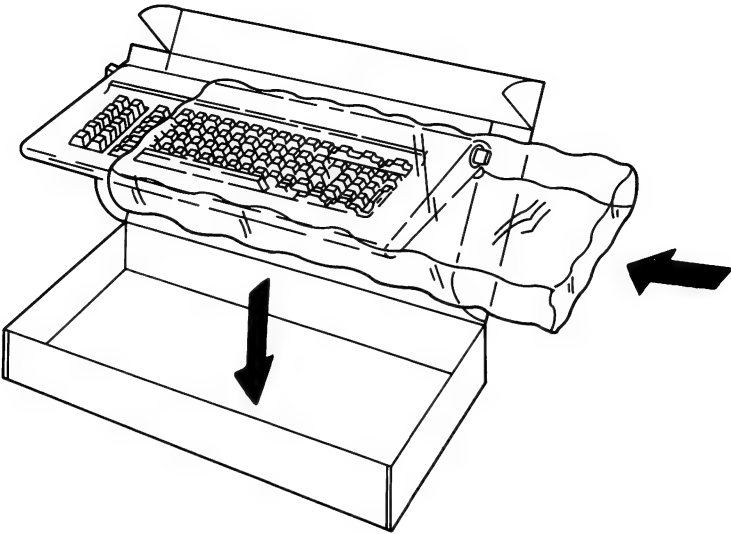
If you still have the original shipping cartons and packing material, pack your units in them as shown below. If you are using different cartons, cushion the units well to avoid damage.

System Unit and Expansion Unit

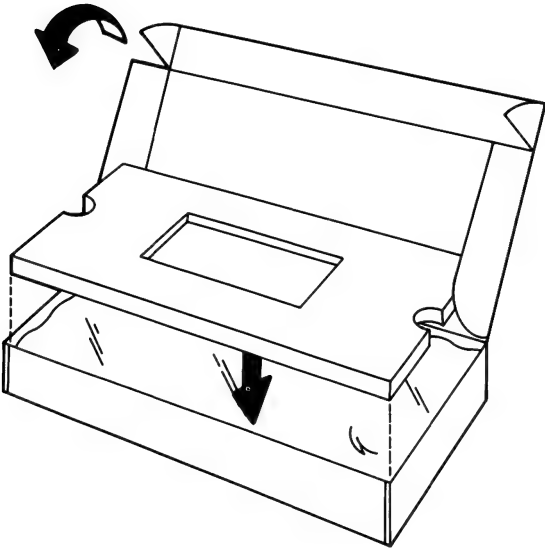


Keyboard

1.

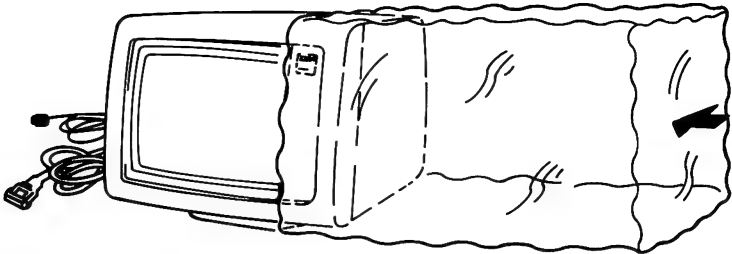


2.

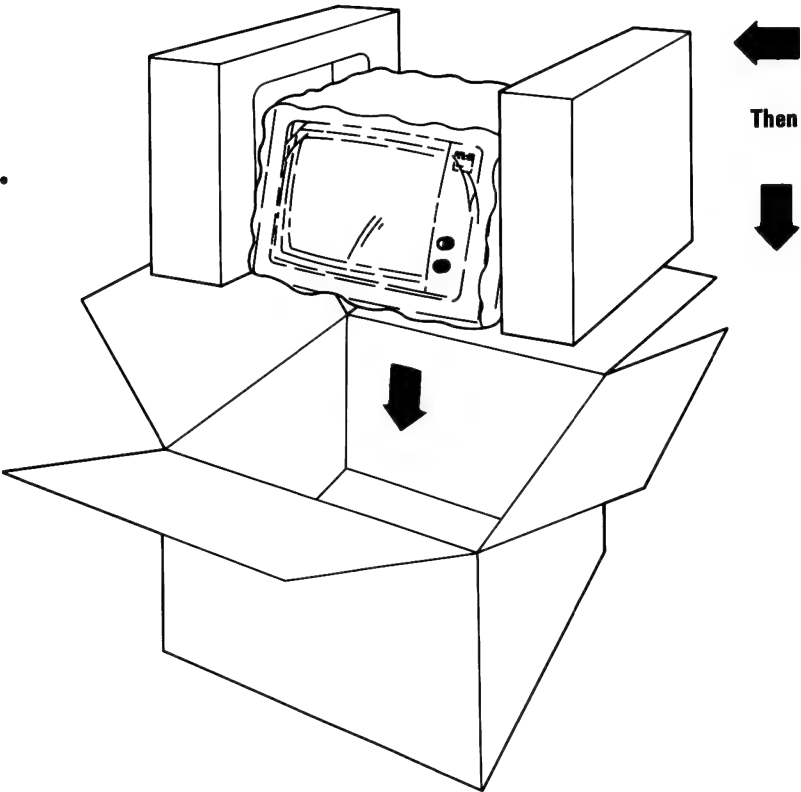


IBM Monochrome or Color Display

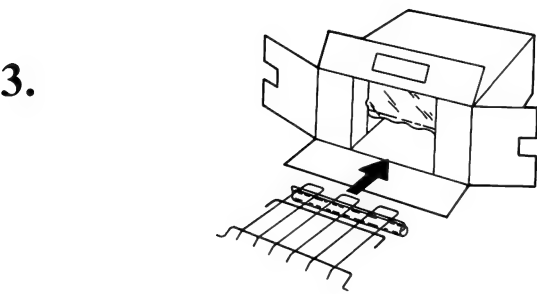
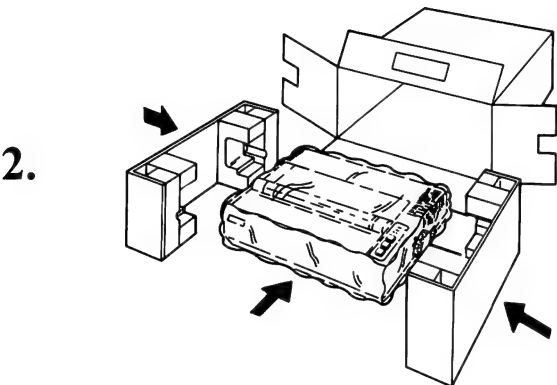
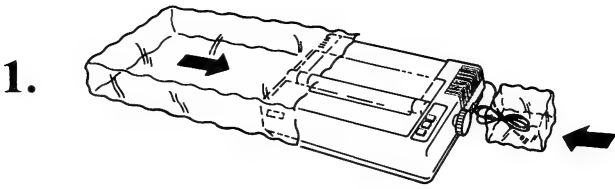
1.



2.



IBM Graphics Printer



Note: The two shipping screws are not required for local handling.

Installation at New Location

When your system arrives at the new location, carefully unpack the system.

Install it as described in “Installation” of this manual.

IBM recommends that whenever you set up your system you perform a system checkout. This procedure is located in “Problem Determination Procedures.”

If you have moved to a different country, refer to your local authorized IBM Personal Computer Dealer for information about the proper cable for your system. If the country voltage is different than the label on the back of your machine, do not plug it in! Contact your dealer.

Notes:

SECTION 7. KEYBOARD TEMPLATES

Contents

Introduction	7-3
French	7-5
German	7-7
Italian	7-9
Spanish	7-11
U.K. English	7-13
U.S. English	7-15

Notes:



Introduction

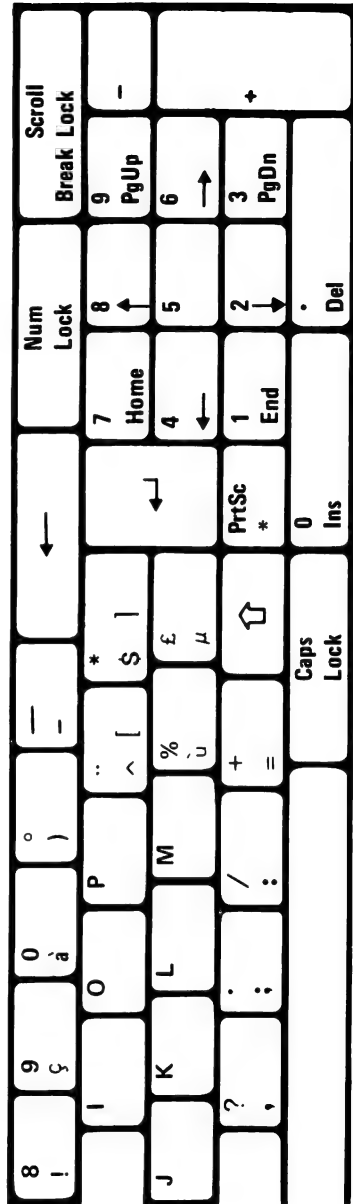
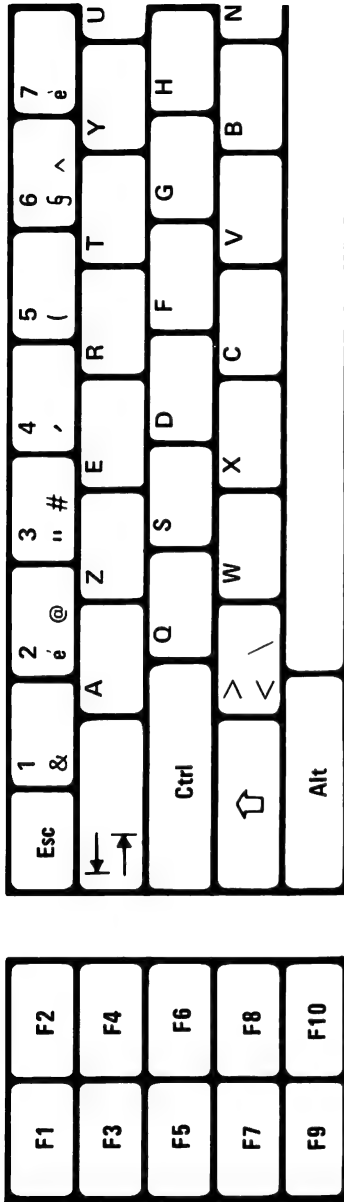
This section has figures showing the layouts of available keyboards. These figures are intended to be cut out (or reproduced) and used as templates for the various languages provided on a National DOS diskette.

If you do not use DOS, your keyboard converts all keystrokes as if you had a U.S. English keyboard, and you should use the U.S. English template as a guide.

Each figure in this section consists of two parts. Tape the parts together to form the template and set the template in the pencil tray above the keys.

Notes:





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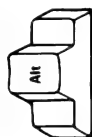
CARACTERES SUPPLEMENTAIRES

1. Appuyez et maintenez



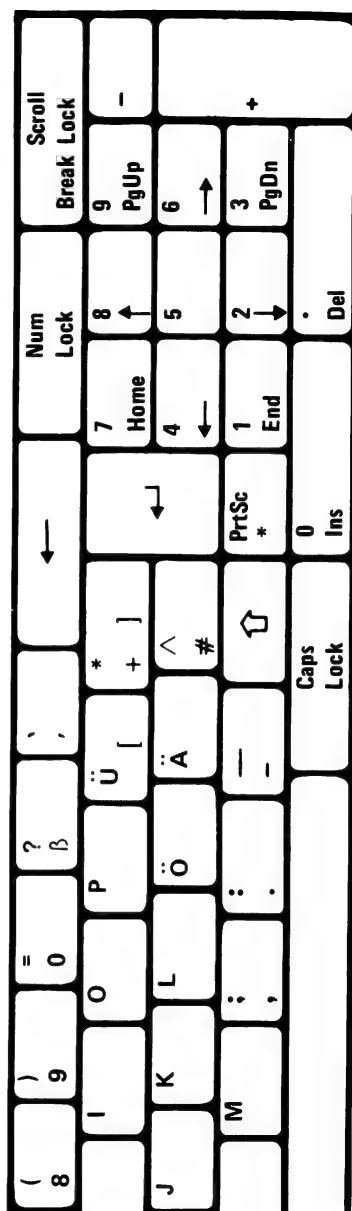
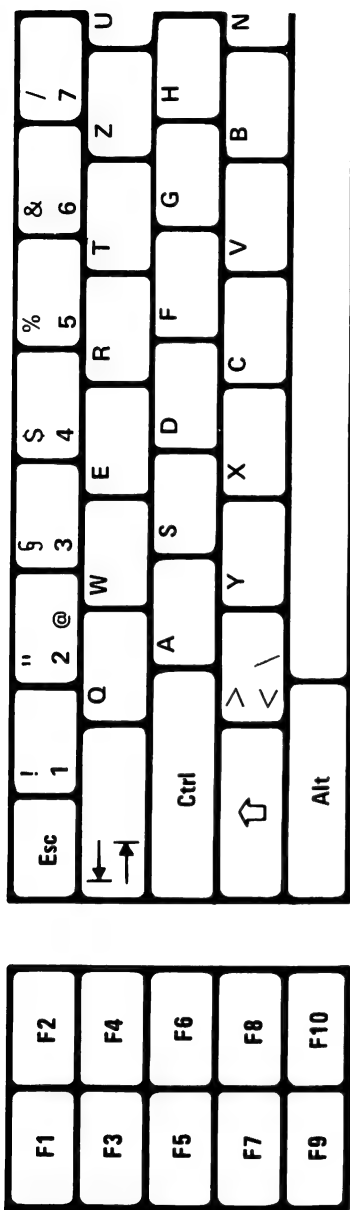
2. Frappez le code de trois chiffres sur le clavier numérique.

3. Relâchez



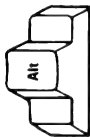
96	'	143	À	160	á	169	┌	226	┐	235	δ	244	∫	254	■
123	{	144	É	161	í	170	└	227	π	236	∞	245	∫		
124	[[145	Æ	162	ó	171	½	228	Σ	237	∅	246	÷		
125]]	146	Æ	163	ú	172	¼	229	σ	238	¢	247	≈		
126	~	149	ø	164	ü	173	í	230	μ	239	∩	249	•		
127	◊	155	¢	165	ñ	174	«	231	τ	240	≡	250	•		
128	Ç	157	¥	166	ä	175	»	232	◊	241	±	251	√		
134	à	158	Pts	167	ö	224	∞	233	⊕	242	≥	252	n		
141	ï	159	f	168	ì	225	β	234	Ω	243	≤	253	²		

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ZUSÄTZLICHE ZEICHEN



1.

Betätigen und halten.

2. Ein 3-Zahlencode auf der Addiermaschinentastatur eingeben.



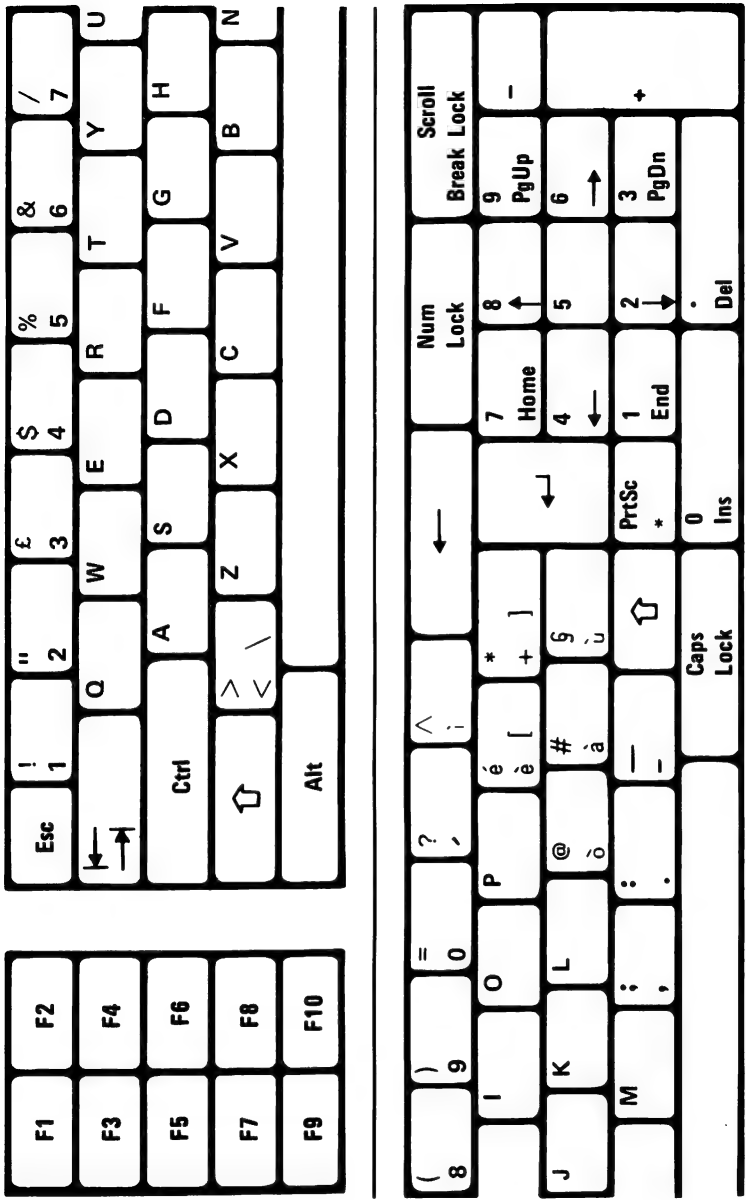
3.

loslassen.



123	{	136	ê	152	ÿ	167	o	224	∞	234	Ω	243	≤	252	∞
124	--	139	ï	155	¢	168	í	226	┐	235	δ	244	∫	253	²
125	}	140	í	156	£	169	┐	227	π	236	∞	245	÷	254	■
126	~	141	í	157	₣	170	┐	228	Σ	237	Ø	246	≈		
127	□	143	Å	158	Pts	171	½	229	σ	238	€	247	°		
128	Ç	145	œ	159	f	172	¼	230	μ	239	∩	248	•		
131	ä	146	Æ	164	ñ	173	ı	231	τ	240	≡	249	•		
134	ä	147	ô	165	Ñ	174	«	232	‰	241	±	250	•		
135	ç	150	û	166	ä	175	»	233	ø	242	≥	251	√		

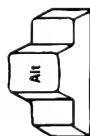
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Italian



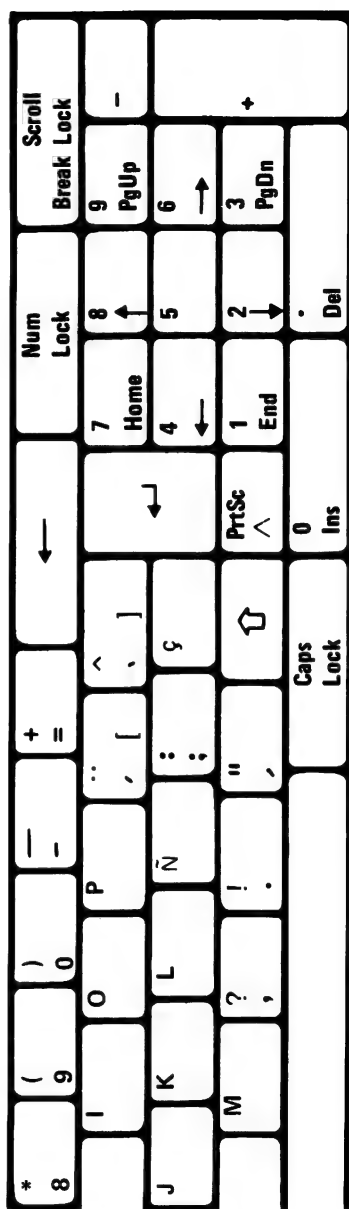
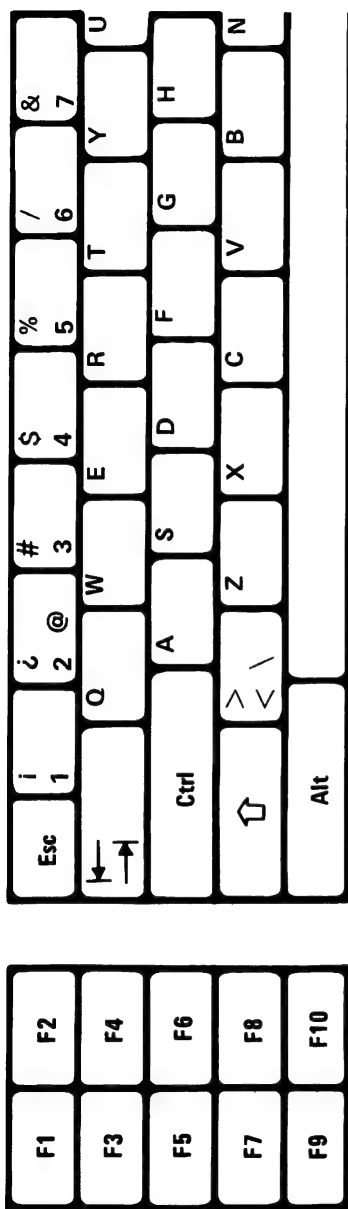
This template may be reproduced by the owner of the manual for the owner's use. If the owner transfers this manual, any copies made must be destroyed or transferred with the manual.

1. Premere e tenere premuto il tasto 
2. Battere un codice di tre cifre sulla tastiera numerica.
3. Rilasciare il tasto 



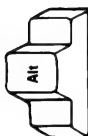
96	137	148	160	169	226	235	244	253
·	ë	ö	á	—	⌈	δ	∫	■
139	139	150	161	170	227	236	245	254
ı	ı	û	ı	—	π	∞	÷	
140	140	152	ö	171	228	237	246	
ı	ı	ÿ	ö	½	Σ	∅	≈	
142	142	153	Ö	¾	σ	ℓ	≈	
Ä	Ä	Ü	ü	172	229	238	≈	
143	143	154	Ü	173	230	239	°	
ä	ä	155	ü	ı	μ	∩	•	
132	144	155	165	174	231	240	•	
ä	É	€	Ñ	«	τ	≡	•	
134	145	157	ä	175	232	241	•	
ä	æ	₣	166	»	ǫ	±	√	
133	146	158	167	224	233	242	√	
134	135	Pts	ö	œ	ϕ	≥	√	
135	147	f	168	β	Ω	≤	√	
136	137	ö	169	225	234	243	√	
136	137	ö	169	225	234	243	√	

7-10 Templates



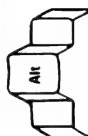
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CARACTERES ADICIONALES



1. Pulse y mantenga pulsada la tecla

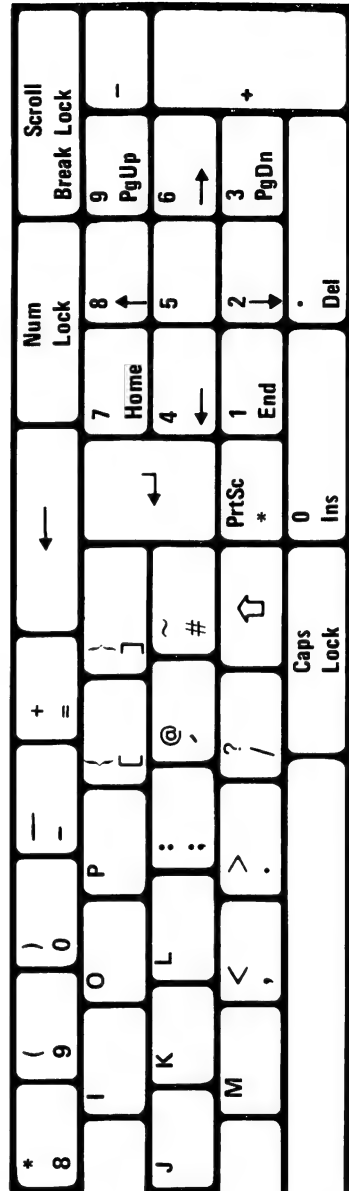
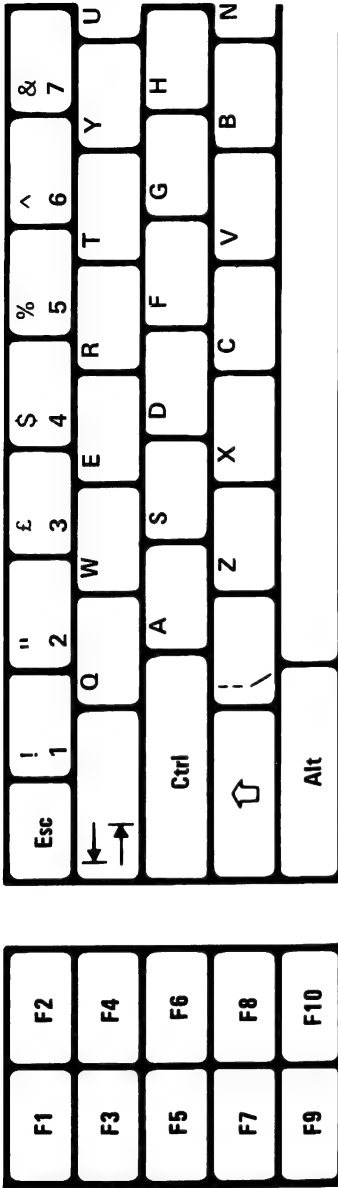
2. Teclee un código de 3 dígitos en el teclado numérico (Lado derecho del teclado)



3. Libere

123 {	156 £	172 ¼	230 μ	239 ∩	248 °
124	157 ¥	174 «	231 τ	240 ≡	249 •
125 }	158 ₧	175 »	232 ¢	241 ±	250 ·
126 ~	159 ₣	224 ∞	233 ø	242 ≥	251 √
127 □	166 ¢	225 β	234 Ω	243 ≤	252 ∞
134 à	167 ¢	226 ∟	235 δ	244 ∫	253 ²
145 æ	169 —	227 π	236 ∞	245 ∫	254 ■
146 Æ	170 —	228 Σ	237 Ø	246 ÷	
155 €	171 ½	229 σ	238 €	247 ≈	

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ADDITIONAL CHARACTERS

1. Press and hold



2. Type 3 digit code on numeric keypad.

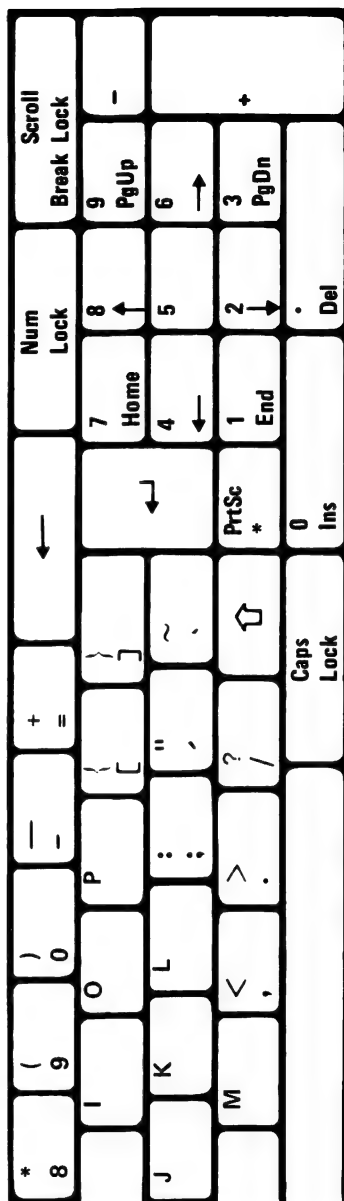
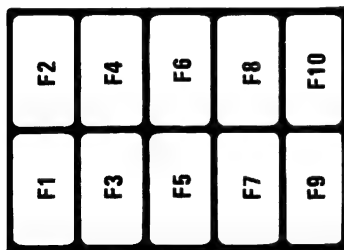
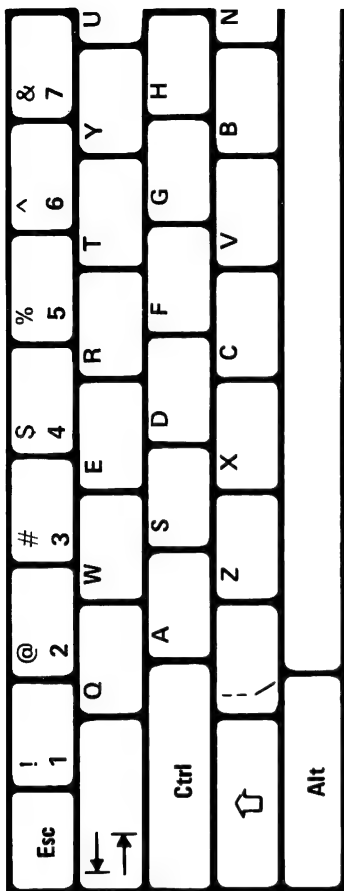


3. Release

96	·	135	ç	144	É	153	Ö	163	ú	172	¼	229	σ	238	€	247	≈
127	◊	136	ê	145	æ	154	Ü	164	û	173	½	230	μ	239	∩	248	°
128	Ç	137	ë	146	Æ	155	€	165	ü	174	«	231	τ	240	≡	249	•
129	ü	138	è	147	ö	156	£	166	ä	175	»	232	ø	241	±	250	•
130	é	139	í	148	ó	157	¢	167	ö	224	↔	233	ø	242	≥	251	√
131	á	140	í	149	ô	158	pts	168	í	225	β	234	Ω	243	≤	252	π
132	ä	141	î	150	û	159	f	169	—	226	Γ	235	δ	244	∫	253	²
133	ä	142	Ä	151	ü	160	á	170	—	227	π	236	∞	245	∫	254	■
134	ä	143	À	152	ÿ	162	ó	171	½	228	Σ	237	Ø	246	÷		

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U.S. English



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1. Press and hold


2. Type 3 digit code on numeric keypad.

3. Release

[illegible]


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GLOSSARY



adapter. An auxiliary device or unit used to extend the operation of another system.


ASCII. American Standard Code for Information Interchange. The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information exchange between data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.



backup. Duplicating data from a fixed disk drive or diskette to a diskette which ensures availability of data in the event of loss or damage to the original.

BASIC. Beginner's all-purpose symbolic instruction code. A programming language that uses common English words.

basic input/output system (BIOS). The feature of the IBM Personal Computer that provides the level control of the major I/O devices, and relieves the programmer from concern about hardware device characteristics.



binary synchronous communications (BSC). A uniform procedure, using a standardized set of control characters and control character sequences for synchronous transmission of binary-coded data between stations.

BIOS. Basic input/output system.

BSC. Binary synchronous communications.

byte. (1) A sequence of eight adjacent binary digits that are operated upon as a unit. (2) A binary character operated upon as a unit. (3) The representation of a character.

characters per second (cps). A standard unit of measurement for the speed at which a printer prints.

computer. A functional unit that can perform substantial computation, including numerous arithmetic operations or logic operations, without intervention by a human operator during a run.

cps. Characters per second.

CPU. Central processing unit.

cursor. (1) In computer graphics, a movable marker that is used to indicate a position on a display. (2) A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. (3) A movable spot of light on the screen of a display device, usually indicating where the next character is to be entered, replaced, or deleted.

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations, such as characters or analog quantities, to which meaning is, or might be assigned.

DIP. Dual in-line package.

DIP switch. One of a set of small switches mounted in a dual in-line package.

disk. Loosely, a magnetic disk.

diskette. A thin, flexible magnetic disk and a semirigid protective jacket, in which the disk is permanently enclosed. Synonymous with flexible disk.

diskette drive. A device for storing data on and retrieving data from a diskette.

display. (1) A visual presentation of data. (2) A device for visual presentation of information on any temporary character imaging device. (3) To present data visually.

EIA/CCITT. Electronic Industries Association/International Telegraph and Telephone Consultative Committee.

FCC. Federal Communications Commission.

fixed disk drive. In the IBM Personal Computer, a unit consisting of nonremovable magnetic disks, and a device for storing data on and retrieving data from the disks.

flexible disk. Synonym for diskette.

format. The arrangement or layout of data on a data medium.

hardware. (1) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (2) Contrast with software.

head. A device that reads, writes, or erases data on a storage medium; for example, a small electromagnet used to read, write, or erase data on a magnetic disk.

interface. A device that alters or converts actual electrical signals between distinct devices, programs, or systems.

joystick. In computer graphics, a lever that can pivot in all directions and that is used as a locator device.

Kb. Kilobyte; 1024 bytes.

load. In programming, to enter data into storage or working registers.

magnetic disk. (1) A flat circular plate with a magnetizable surface layer on which data can be stored by magnetic recording. (2) See also diskette.

Mb. Megabyte; 1,048,576 bytes.

microprocessor. An integrated circuit that accepts coded instructions for execution; the instructions may be entered, integrated, or stored internally.

modem (modulator-demodulator). A device that converts serial (bit by bit) digital signals from a business machine (or data communication equipment) to analog signals that are suitable for transmission in a telephone network. The inverse function is also performed by the modem on reception of analog signals.

module. (1) A program unit that is discrete and identifiable with respect to compiling, combining with other units, and loading. (2) A packaged functional hardware unit designed for use with other components.

monitor. Synonym for cathode ray tube display (CRT display).

most-significant digit. The leftmost (non-zero) digit. See also high-order position.

NTSC. National Television System Committee. A group that has set United States television broadcast standards.

operating system. Software that controls the execution of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management.

output. Pertaining to a device, process, or channel involved in an output process, or to the data or states involved in an output process.

output process. (1) The process that consists of the delivery of data from a data processing system, or from any part of it. (2) The return of information from a data processing system to an end user, including the translation of data from a machine language to a language that the end user can understand.

paddle. A user supplied device that connects to the Game Control Adapter.

personal computer. A small home or business computer that has a processor and keyboard and that can be connected to a television or some other monitor. An optional printer is usually available.

power supply. A device that produces the power needed to operate electronic equipment.

processor. (1) In a computer, a functional unit that interprets and executes instructions. (2) A functional unit, a part of another unit such as a terminal or a processing unit, that interprets and executes instructions. (3) Deprecated term for processing program. (4) See microprocessor.

program. (1) A series of actions designed to achieve a certain result. (2) A series of instructions telling the computer how to handle a problem or task. (3) To design, write, and test computer programs.

programming language. (1) An artificial language established for expressing computer programs. (2) A set of characters and rules with meanings assigned prior to their use, for writing computer programs.

programming system. One or more programming languages and the necessary software for using these languages with particular automatic data-processing equipment.

prototype card. A blank circuit card which can be used to create custom adapters.

RAM. Random access memory. Read/write memory.

random access memory (RAM). Read/write memory.

read-only memory (ROM). A storage device whose contents cannot be modified. The memory is retained when power is removed.

read/write memory. A storage device whose contents can be modified. Also called RAM.

reverse video. A form of highlighting a character, field, or cursor by reversing the color of the character, field,

or cursor with its background; for example, changing a red character on a black background to a black character on a red background.

RF. Radio frequency.

RF modulator. The device used to convert the composite video signal to the antenna level input of a home TV.

ROM. Read-only memory.

ROM/BIOS. The ROM resident basic input/output system, which provides the level control of the major I/O devices in the computer system.

run. A single continuous performance of a computer program or routine.

schematic. The representation, usually in a drawing or diagram form, of a logical or physical structure.

SDLC. Synchronous Data Link Control.

sector. That part of a track or band on a magnetic drum, a magnetic disk, or a disk pack that can be accessed by the magnetic heads in the course of a predetermined rotational displacement of the particular device.

setup. (1) In a computer that consists of an assembly of individual computing units, the arrangement of interconnections between the units, and the adjustments needed for the computer to operate. (2) The preparation of a computing system to perform a job or job step. Setup is usually performed by an

operator and often involves performing routine functions, such as mounting tape reels. (3) The preparation of the system for normal operation.

signal. A variation of a physical quantity, used to convey data.

software. (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

storage. (1) A storage device. (2) A device, or part of a device, that can retain data. (3) The retention of data in a storage device. (4) The placement of data into a storage device.

Synchronous Data Link Control (SDLC). A protocol for management of data transfer over a data link.

synchronous transmission. (1) Data transmission in which the time of occurrence of each signal representing a bit is related to a fixed time frame. (2) Data transmission in which the sending and receiving devices are operating continuously at substantially the same frequency and are maintained, by means of correction, in a desired phase relationship.

syntax. (1) The relationship among characters or groups of characters, independent of their meanings or the manner of their interpretation and use. (2) The structure of expressions in a language. (3) The rules governing the structure of a language. (4) The relationships among symbols.

text. In ASCII and data communication, a sequence of characters treated as an entity if preceded and terminated by one start-of-text and one end-of-text transmission control character, respectively.

track. (1) The path or one of the set of paths, parallel to the reference edge on a data medium, associated with a single reading or writing component as the data medium moves past the component. (2) The portion of a moving data medium such as a drum, or disk, that is accessible to a given reading head position.

translate. To transform data from one language to another.

transmission. (1) The sending of data from one place for reception elsewhere. (2) In ASCII and data communication, a series of characters including headings and text. (3) The dispatching of a signal, message, or other form of intelligence by wire, radio, telephone, or other means. (4) One or more blocks or messages. For BSC and start-stop devices, a transmission is terminated by an EOT character. (5) Synonymous with data transmission.

typematic. Keyboard buttons that will repeat when held depressed.

video. Computer data or graphics displayed on a cathode ray tube, monitor, or display.

word. (1) A character string or a bit string considered as an entity. (2) See computer word.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

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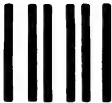
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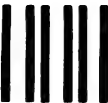
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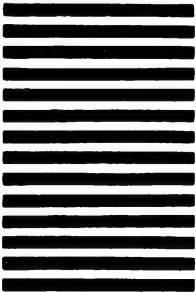
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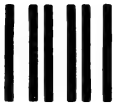
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